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User Manual

UT8806E Desktop Digital Multimeter

Copyright and Statement

Preface

Dear User,

Thank you for choosing this brand new UNI-T instrument. In order to use this instrument safely and correctly, please read this manual thoroughly, especially the Safety Requirements part.

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

Copyright

The instrument has a warranty period of three years from the date of purchase. If the instrument is damaged due to improper operation by the user during the warranty period, the maintenance fee and the costs caused by the maintenance shall be borne by the user, and the instrument shall be maintained by the company for life.

If the original purchaser sells or transfers the product to a third party within three years from the date of purchase of the product, the warranty period of one year shall be from the date of the original purchase from UNI-T or an authorized UNI-T distributor. Power cords, accessories and fuses, etc. are not included in this warranty.

If the product is proved to be defective within the warranty period, UNI-T reserves the right to either repair the defective product without charging of parts and labor, or exchange the defected product to a working equivalent product (determined by UNI-T). Replacement parts, modules and products may be brand new, or perform at the same specifications as brand new products. All original parts, modules, or products which were defective became 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 perform appropriate arrangements for the warranty service.

The customer shall be responsible for packing and shipping the defective products to the individual or entity that is declared in the guarantee. In order obtain the warranty service, customer must inform the defects within the applicable warranty period to UNI-T, and 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 products is shipped domestically to the purchase receipt of the original purchaser. If the product is shipped 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.

Trademark

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File Version

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Statement

- UNI-T products are protected by patent rights in China and foreign countries, including issued and pending patents.
- UNI-T reserves the rights to any product specification and pricing changes.
- UNI-T reserves all rights. Licensed software products are properties of Uni-Trend and its subsidiaries or suppliers, which are protected by national copyright laws and international treaty provisions. Information in this manual supersedes all previously published versions.

General Safety Summary

The instrument is designed to meet the safety requirements of GB4793 safety requirements for electronic measuring instruments, IEC/EN61010-1, EN61010-2-030 pollution class 2, overvoltage CATII 300V and double Insulation; and complies with the IP65 standard for waterproofing and dustproofing.

This manual contains information and warnings that must be observed to keep the instrument in a safe condition and ensure safe operation. To prevent potential hazards, always operate this product strictly in accordance with the manufacturer's specifications. Failure to do so may result in personal injury, damage to the product, or harm to connected equipment.

Use Proper Power Cord. Use only the power cord specified for this product and certified for the country of use, and make sure that no metal parts are exposed and the insulation is broken.

Ground the Product. This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded. The signal ground on the rear panel of the product is the same as the ground potential.

Check the Wire. Check if the insulation of the test lead is damaged or if the lead is exposed; check if the test lead is on, if there is any damage to the lead, replace it before using the instrument.

Observe All Terminal Ratings. The voltage applied between the terminals or any one of the terminals and the grounding point must not exceed the rated value indicated on the instrument.

Do Not Touch Live Part. Do not touch exposed connection wires, unused inputs or circuits being measured while the instrument is in use. When measuring voltages higher than 60V DC or 30V AC, be sure to exercise caution and remember to keep your fingers away from the meter's guard position to prevent electric shock.

Do Not Operate with Suspected Failures. If you suspect that this product is malfunctioning, contact UNI-T's authorized service personnel for testing. Any maintenance, adjustment, or replacement of parts on this product must be performed by UNI-T authorized service personnel.

Avoid Exposed Circuitry. Do not touch exposed connections and components when power is present.

Do Not Operate Without Covers. Do not operate this product with covers or panels removed, and do not adjust the internal circuit.

Use Proper Fuse. Use only the fuse type and rating specified for this product.

Use Proper Over-voltage Protection. Make sure that no overvoltage (e.g. caused by lightning) reaches the product, as this may result in electric shock to the operator.

Avoid Severe Environment. Avoid using the instrument in high temperature, high humidity, flammable, explosive and strong electromagnetic environments.

Disconnect the Power Supply. Before testing the impedance, conduction, diodes, or capacitance, disconnect power and discharge all high voltage capacitors.

Input Terminal Protection Limit

1. Main Input Terminal (HI and LO)

   HI and LO input terminals are used for voltage, impedance, capacitance, continuity, frequency and diode test measurements. These two terminals define the following two protection limits.

   1) Protection limit from HI to LO, which is 1000 VDC or 750 VAC. This is also the maximum voltage that can be measured. This limit can also be expressed as a maximum of 1000 Vpk.
   2) Protection limit from LO to ground. The LO input terminal can be safely "floated" to a maximum of 500 Vpk with respect to ground. The protective limit of the HI terminal is a maximum of 1000 Vpk with respect to ground. Therefore, the sum of the "floating" voltage and the measured voltage must not exceed 1000 Vpk.

2. Sampling Terminal (HI sense and LO sense)

   HI Sense and LO Sense terminals are used for four-wire impedance test and measurement. These two terminals define the following two protection limits.

   1) Protection limit from HI Sense to LO Sense. Protection limit of HI Sense and LO Sense are 200 Vpk.
   2) Protection limit from LO Sense to LO. Protection limit of LO Sense and LO are 2 Vpk.

3. Current Input Terminal (mA and A)

   1) The mA and LO terminal are used to measure the current test below 200 mA. The rear panel fuse provides a maximum protection limit of 250 mA for current flowing through the mA terminal.
   2) The A and LO terminal are used to measure the current test from 200 mA to 10 A. The rear panel fuse provides a maximum protection limit of 10 A for current flowing through the A terminal.

Notes

The voltage at the current input terminal is about the same as the voltage at the LO terminal. To maintain good protection, this fuse can only be replaced with a fuse of the specified type and rating.

IEC Measurement Category II Overvoltage Protection

To avoid the risk of electric shock, the UT8806E digital multimeter provides overvoltage protection for electric mains connections that meet both of the following conditions.

1. The HI and LO input terminals are connected to the electric mains under Measurement Category II conditions (described below).
2. The maximum line voltage of the electric mains is 300 VAC.

Warnings

IEC measurement category II includes electrical installations connected to the mains via a socket on a branch circuit. These devices include most small appliances, test equipment, and other devices plugged into branch circuit sockets.

Measurement of UT8806E Digital Multimeter

The HI and LO input terminals are connected to the electric mains (up to 300 VAC) in these devices, or to branch circuit socket. However, the HI and LO input terminals of the UT8806E cannot be connected to the electric mains in permanently installed electrical devices, such as main breaker panels, sub-panel breakout boxes, or permanently wired motors. These devices and circuits are susceptible to overvoltage that exceed the protection limits of the UT8806E.

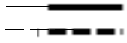
Notes

The voltage above 300VAC can only be measured in circuits that disconnect from the electric mains. However, transient overvoltage also exists in circuits when disconnected from the electric mains, and the UT8806E can safely withstand incidental transient overvoltage up to 2500 Vpk.

Do not use this device to measure circuits where transient overvoltage may exceed this level.

Safety Term and Symbol

Safety Symbol		
	Danger	It indicates possible danger of electric shock, which may cause personal injury or death.
	Warning	It indicates that you should be careful to avoid personal injury or product damage.
	Caution	It indicates possible danger, which may cause damage to this device or other equipment if you fail to follow a certain procedure or condition. If the "Caution" sign is present, all conditions must be met before you proceed to operation.
	Notes	It indicates potential problems, which may cause failure of this device if you fail to follow a certain procedure or condition. If the "Notes" sign is present, all conditions must be met before this device will function properly.
	AC	Alternating current of device.

	DC	Direct current of device
	Grounding	Frame and chassis grounding terminal
	Grounding	Protective grounding terminal
	Grounding	Measurement grounding terminal
	Power Supply	Standby power supply: when the power switch is turned off, this device is not completely disconnected from the AC power supply.
CAT I		Secondary electrical circuit connected to wall sockets through transformers or similar equipment, such as electronic instruments and electronic equipment; electronic equipment with protective measures, and any high-voltage and low-voltage circuits, such as the copier in the office.
CAT II		Primary electrical circuit of the electrical equipment connected to the indoor socket via the power cord, such as mobile tools, home appliances, etc. Household appliances, portable tools (e.g. electric drill), household sockets, sockets more than 10 meters away from CAT III circuit or sockets more than 20 meters away from CAT IV circuit.
CAT III		Primary circuit of large equipment directly connected to the distribution board and circuit between the distribution board and the socket (three-phase distributor circuit includes a single commercial lighting circuit). Fixed equipment, such as multi-phase motor and multi-phase fuse box; lighting equipment and lines inside large buildings; machine tools and power distribution boards at industrial sites (workshops).
CAT IV		Three-phase public power unit and outdoor power supply line equipment. Equipment designed to "initial connection", such as power distribution system of power station, power instrument, front-end overload protection, and any outdoor transmission line.
	Certification	CE indicates a registered trademark of EU.
	Certification	UKCA indicates a registered trademark of British.
	Certification	ETL indicates a registered trademark of Intertek. (Conforms to UL STD 61010-1,61010-2-030, and certified to CSA STD C22.2 NO.61010-1, 61010-2-030)
	Waste	This product complies with the marking requirements of WEEE Directive (2002/96/EC). This additional label indicates that this electrical / electronic product must not be discarded in household waste.
	EFUP	This environment-friendly use period (EFUP) mark indicates that dangerous or toxic substances will not leak or cause damage within this indicated time period. The environment-friendly use period of this product is 40 years, during which it can be used safely. Upon expiration of this period, it should enter the recycling system.

UT8806E Introduction

UT8806E is a 6½-digit desktop digital multimeter with a maximum display of 2,000,000, featuring high accuracy, versatility, and full automation. In addition to the most basic measurements, it has various mathematical operation functions, and supports capacitance, temperature and other measurements.

UT8806E is equipped with a 4.3-inch TFT display with 480*272 resolution and supports LAN, USB, RS-232C and GPIB (option), making it suitable for use as a laboratory work meter and for high-precision measurements in automated test systems.

Main Features

- Real 6½-digit resolution
- Minimum integral time: 0.006 PLC
- Dual display function can present two features of the same input signal at the same time
- DC voltage range of 200 mV to 1000 V
- DC current range of 2 μA to 10 A
- True-RMS, AC voltage range of 200 mV to 750 V
- True-RMS, AC current range of 200 μA to 10 A
- Impedance range of 20 Ω to 1 GΩ, 2-wire, 4-wire impedance measurement
- Capacitance range of 2 nF to 200 mF
- Frequency measuring range of 20 Hz to 1 MHz
- Continuity and diode test
- Temperature test, built-in thermocouple cold-end compensation
- Multiple mathematical operations: Mimum, minimum, average, standard deviation, Pass/Fail, dBm, dB, relative measurement, histogram, tendency chart, and bar chart
- USB is for saving data and configuration
- Supports USB, GPIB, RS-232C, and LAN interfaces
- Supports USB-TMC, IEEE 488.2, VXI11, and SCPI
- Compatible with the newest mainstream multimeter SCPI command set
- Record and save the historical measured results
- 32Gb NANDFLASH capacity for saving the system configuration and test data
- Chinese/English menu and on-line help system
- PC control software
- Supports global mains voltage

About this Manual

This manual provides information on the operation of the UT8806E digital multimeter and includes the following chapters.

Chapter 1 Quick Guide

This chapter is to guide you through the front/rear panel and user interface and get the UT8806E digital multimeter ready.

Chapter 2 Panel Operation

This chapter is to introduce various functions and operations of multimeter in detail.

Chapter 3 Measurement Guide

This chapter provides information on how to eliminate the possible errors in measurement to obtain accurate measured results.

Chapter 4 Applications

This chapter provides detailed information on using the UT8806E to make electrical measurements.

Chapter 5 Troubleshooting

This chapter provides detailed information on system prompt and common troubleshooting.

Chapter 6 Appendices

This chapter provides details of attachments, warranty and service and support information.

Table of Contents

Chapter 1 Quick Gide

This chapter is to introduce the preparation of the UT8806E digital multimeter and simply introduce the front/rear panel and display screen.

- General Inspection
- Adjusting Handle
- External Dimension
- Front Panel
- Rear Panel
- Power-on
- User Interface
- Help System
- General Specifications
- Fuse Specifications

General Inspection

1. Check for damage caused by transportation

   If you find that the packing carton or protective foam cushion is badly damaged, keep it until the complete unit and accessories have passed the electrical and mechanical tests.

2. Checking accessories

   The details of the supplied accessories are described in Appendix A in Chapter 6 of this manual. You can refer to these instructions to check for missing accessories.

   If you find that an accessory is missing or damaged, contact the UNI-T distributor responsible for your business or the local UNI-T office.

3. Checking the complete unit

   If you find that the instrument is visually damaged, that the instrument is not working properly, or that it fails a performance test, contact the UNI-T distributor responsible for the operation or the local UNI-T office.

   If the instrument is damaged due to transportation, please retain the packaging. Notify the shipping department and the UNI-T distributor. UNI-T will arrange for repair or replacement.

Adjusting Handle

The multimeter's handle can adjust to three positions by appropriate strengths, as shown in Figure 1-1, 1-2, and 1-3.

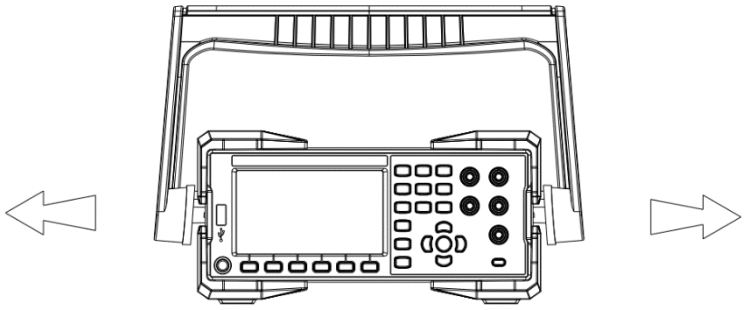


Figure 1-1 Adjusting Handle

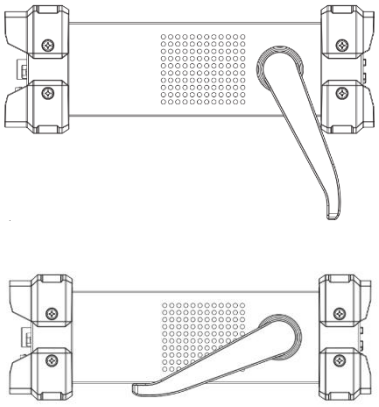


Figure 1-2 Holding Down Position

Figure 1-3 Moving Position

External Dimension

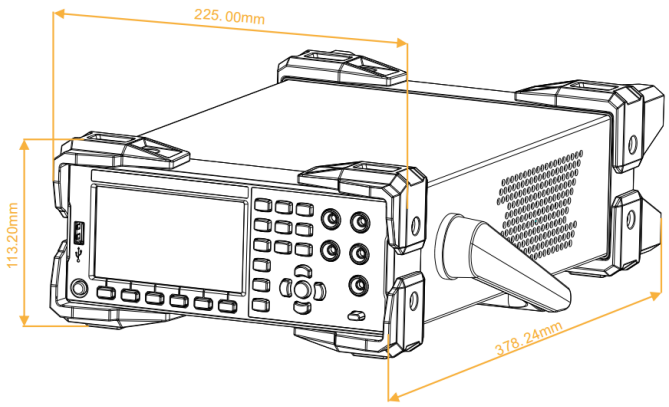


Figure 1-4 External Dimension

Front Panel

UT8806E digital multimeter provides the user with a simple and clear front panel. These controls are displayed in logical groupings, and basic operations can be performed by simply selecting the appropriate button, as shown in Figure 1-5.

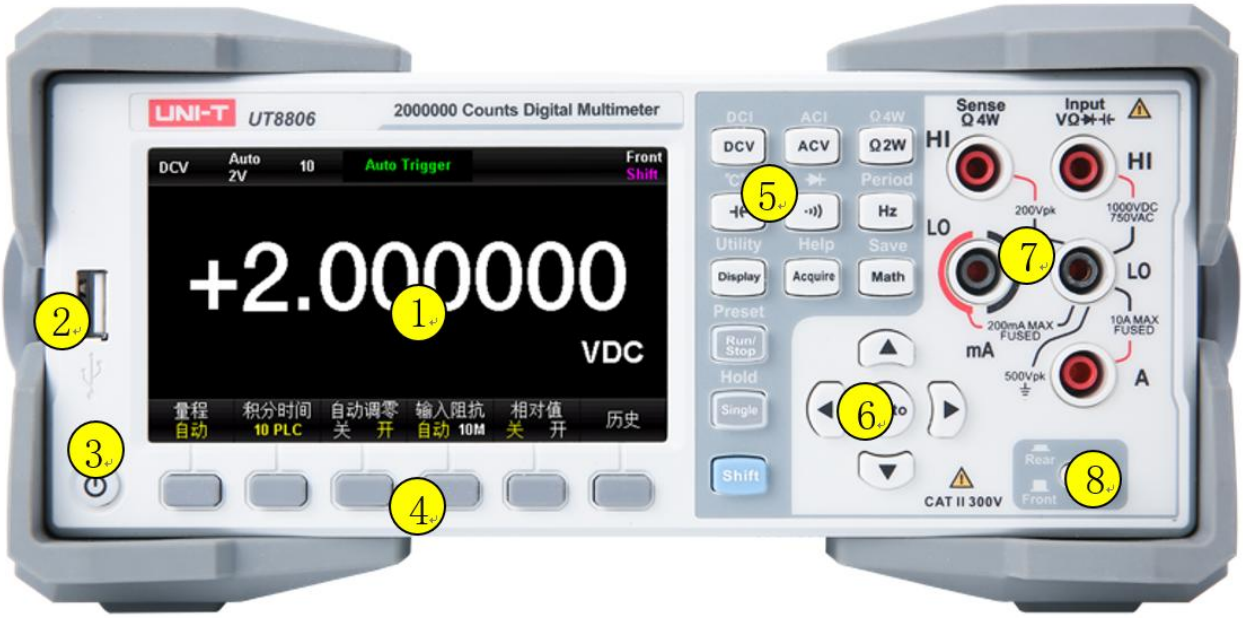


Figure 1-5 Front Panel

1： LCD

The 4.3-inch TFT display with a resolution of 480*272, showing the menu and measurement parameter settings, the system status and prompt messages.

2：USB

This interface allows storing the current instrument status or measurement data to an external device, as well as reading stored instrument status or upgrade files from an external device when needed.

3：Power Button

Short press/long press the power button to turn on/off the multimeter. UT8806E has a power memory function, which is restore to the state before power off after power on.

4：Menu Operation Key

Press any one of soft key to activate the menu.

5：Measurement and Auxiliary Function Key

DC voltage measurement or DC current measurement (secondary function)

AC voltage measurement or AC current measurement (secondary function)

2-wire impedance measurement or 4-wire impedance measurement (secondary function)

Capacitance measurement or match with probe temperature measurement (secondary function)


Continuity measurement or diode measurement (secondary function)

Signal frequency measurement or signal period measurement (secondary function)

Dual display function or auxiliary system function (secondary function)

Sampling setting or auxiliary help system (secondary function)

Mathematical operation or storage function (secondary function)

Start/stop or return function

Manual trigger or reading hold function

Secondary function or key switching

6：Range and Direction Key

Automatic/manual range


Set the parameter/move the cursor/page turning/range switching


Configure measurement parameter/Select cursor position

7：Signal Input

The signal to be measured is connected to the multimeter via this input terminal. The measurement connection method varies for different measurement objects, so please refer to the description in "Measurement Connection" for details.

8：Front/rear Input Switch

Select the input terminal, when the switch key is pressed, the measurement circuit connects to the input terminal on the rear panel; when the switch key is pop-up, the measurement circuit connects to the input terminal on the front panel. Be sure to disconnect the input signal when switching.

Rear Panel

The rear panel of the UT8806E digital multimeter provides multiple ports, including USB Device, RS-232C, LAN and GPIB (option) as shown in Figure 1-6.

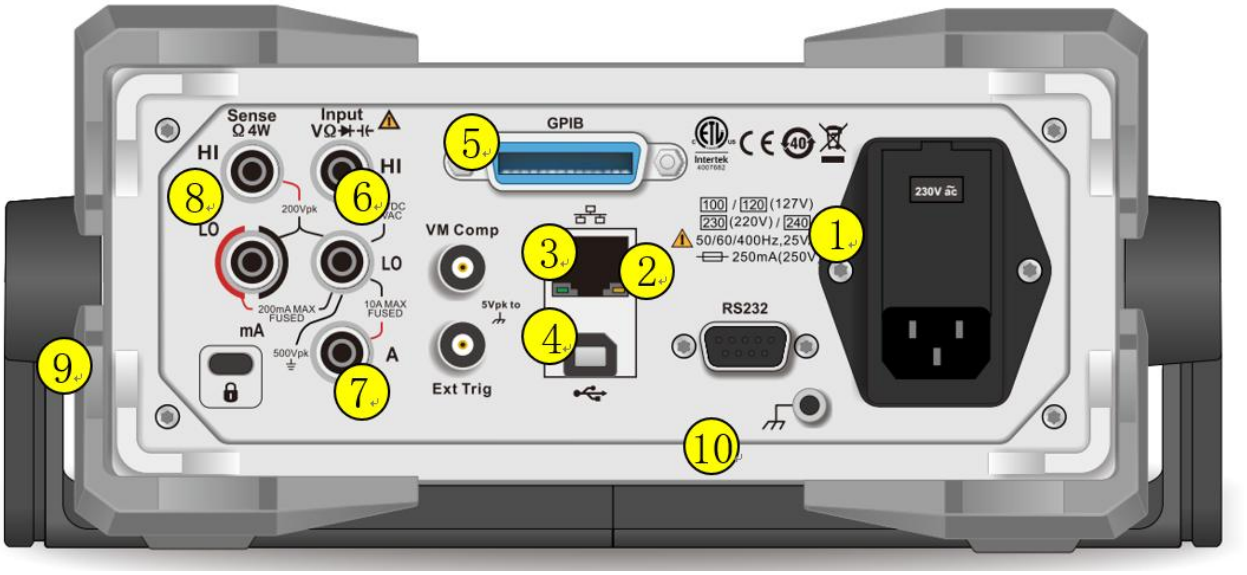


Figure 1-6 Rear Panel

1：Power Input Port

This multimeter can input four sizes of AC power. Use the power cord provided with the accessory to connect AC power to the multimeter through this jack.

Notes: Before connecting AC power, select the correct voltage level (voltage selector inside the socket).

Power Fuse

The multimeter has built-in power fuse when out of the factory. This fuse is a slow blow, explosion proof, **250 mA**, **5x20mm** fuse.

To replace the fuse, follow the steps below.

1) Disconnect the power of the multimeter.
2) Use a screwdriver to pry open the fuse compartment (on the top) and pull out the fuse holder.
3) Select the correct voltage level by dialing the voltage selector according to the voltage range indicated by the socket.
4) Replace the fuse with the specified size.

5) Reinstall the fuse holder into the slot.
6) Close the fuse compartment.

Voltage Selector Turnplate

UT8806E supports 100 Vac/120 Vac/230 Vac/240 Vac frequency of 50 Hz, 60 Hz, 400 Hz industrial AC mains, please confirm the AC power specification you are using, and dial the voltage turnplate according to the label on the left side of the jack to select the correct voltage scale.

2：RS-232 Communication Port

RS-232 serial communication port of UT8806E is 9-pin male socket, which on the rear panel. The pin definition is as follows.

Pin2-----RXD

Pin3-----TXD

Pin5-----GND

3：RJ45 Internet Communication Port

UT8806E is equipped with an RJ45 interface on the rear panel, which supports VXI-11 protocol. Through this interface, the multimeter can connect to the LAN for remote control. For the specific settings, please refer to Chapter 2 Panel Operation-Auxiliary System Functions-I/O Port Configuration.

4：USB-DEVICE Port

UT8806E is equipped with a D-type USB 2.0 port on the rear panel, which supports USB-TMC protocol for communication with a PC. Using the upper computer software to control the multimeter.

5：GPIB Port

For the specific settings, please refer to Chapter 2 Panel Operation-Auxiliary System Functions-I/O Port Configuration.

6：VMC Signal Output Port

UT8806E outputs a pulse with a width of about 1μs and an amplitude of 5V from this port every time it completes a sampling.

7：Ext TRIG Signal Input Port

UT8806E supports external trigger switching, including the rising edge, falling edge and level trigger.

8：Signal Input

There are 5 input terminals in total, arranged in the same order and the same electrical parameters as the previous input terminal.

9：Safety Lock

If needed, you can secure the digital multimeter in a fixed position using a safety lock (sold separately).

Operating Method

Insert the key vertically into the lock hole on the rear panel, then turn it clockwise to lock the digital multimeter. Finally, remove the key.

10：Ground Terminal

Ground the outer shell of UT8806E multimeter through a metal wire.

Power On

Steps to turn on the power:

1. Adjusting AC voltage selectors according to the regional power standard to 100 (95 to 110 V, 50 Hz, 60 Hz, 400 Hz, AC), 120 (110 to 132 V, 50 Hz, 60 Hz, 400 Hz, AC) or 230 (215 to 240V, 50 Hz, 60 Hz, AC), 240 (225 to 265V, 50 Hz,60 Hz, AC).
2. Using the power cable attached with the meter to connect to AC.
3. Observing the power indicator turning to red.
4. Press the power button on the front panel and wait a few seconds for the instrument to start displaying.

Notes: The character with [ ] represents the six software menu below the screen.

User Interface

Single display

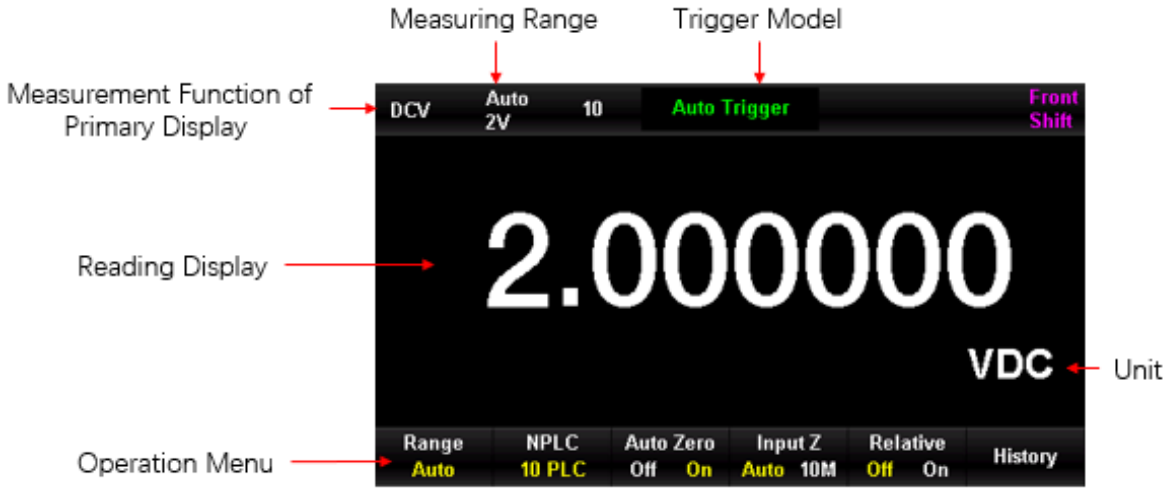


Figure 1-7 Single Display

Dual Display

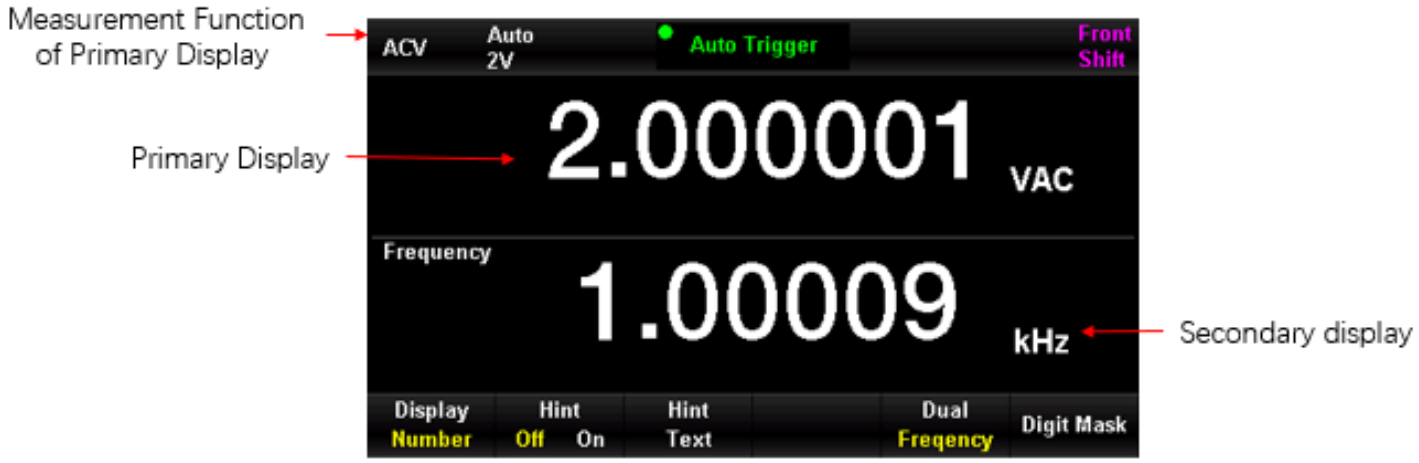


Figure 1-8 Dual Display

Built-in Help System

If you need to get the built-in help information of this product, press [Shift] + [Acquire] to enter the help system at first, then press the arrow keys to select the desired help item, and finally press [OK] to view the corresponding help information.

Built-in Help System

1. Basic Measurement
2. Temperature Measurement
3. Capacitance Measurement
4. Mathematical Operation
5. Dual Display
6. Storage Function

General Specifications

Table 1-1

Specifications	Requirements	Remarks
Operating Temperature (full precision)	0℃ to 28℃ <90%; 28℃ to 40℃ <75%; 40℃to 55℃ <50%	Non-condensing
Operating Environment	Indoor	--
Altitude	≤2000 meters	--
Storage Temperature	-20℃ to 70℃, <95%	If the instrument has been stored in high humidity conditions, operate it continuously for at least 7 days before use.
Mains Ripple	EN61326-1:2013	--
Overvoltage Category	CATII 300V	--
Pollution Degree	CATII	--
Power Los	MAX 25W	--

Fuse Specifications

To ensure user safety and equipment protection, the UT8806E multimeter is equipped with three fuses, each serving a specific role:

Table 1-2

Fuse	Rated Value	Type	Size	Position
Power Input Fuse	250 mA	Slow blow, explosion-proof	5x20 mm	In power socket
Current Input Protection Fuse (200 mA)	250 mA	Fast blow, arc-suppression	6.35x31.8 mm	At instrument bottom
Current Input Fuse (10 A)	10 A	Slow blow	10.3x38 mm	At instrument bottom

Chapter 2 Panel Operation

This chapter is to introduce how to use various functions and operations of the multimeter on the front panel.

- Measurement Configuration
- Basic Measurement
- Auxiliary System Function
- Sampling Setting
- Help System
- Mathematical Operation
- Dual Display
- Display Mode
- Hold Measurement

For more details, please refer to Chapter 1 "Front Panel".

Measurement Configuration

Most of the multimeter's measurement functions can be modified. Measurement change, that means change the range, measurement accuracy, measurement speed and input impedance of the multimeter. By modifying the measurement parameters according to the actual application, faster measurement speed or higher measurement accuracy can be achieved.

The default measurement configuration of the multimeter ensures accurate measurement results in most cases. The user can directly carry out any measurement operation or modify the measurement parameters under various measurement functions as needed.

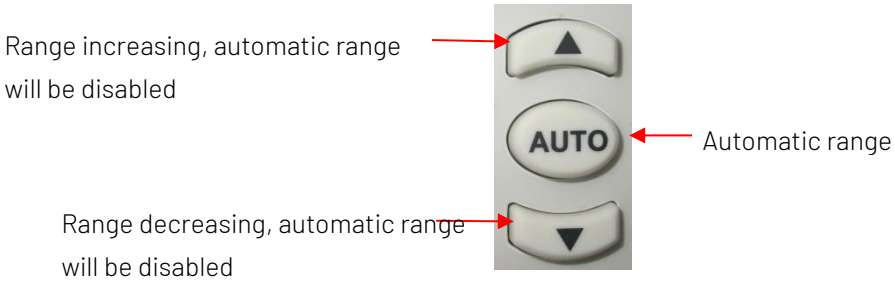
Different parameters can be set for different measurement functions, please refer to the following table.

Table 2-1 Measurment Parameter

Measurement Function	Configuration Parameter
DCV	Range, integral time, input impedance, automatic zeroing
ACV	Range, low-frequency filter
DCI	Range, integral time, automatic zeroing
ACI	Range, low-frequency filter
OHM (2WR, 4WR)	Range, integral time, automatic zeroing, offset compensation (OC)
CAP	Range
CONT	Short-circuit resistance
DIODE	Diode break-over voltage
FREQ/PREIOD	Measuring interval
TEMP	Probe selection, measurement mode

Range Selecting

There are two ways to select the range, automatic and manual. The multimeter can automatically select the appropriate range based on the input signal, so that the input value can be between 10% and 110% of the range, which is very convenient for the user. The user can also select the range manually to get faster readings and more appropriate measurements. The range selection key is located on the right side of the front panel, As illustrated below.



Selection Key on the Front Panel

Method 1 Select the range by using the function key on the front panel

Automatic range: Press the 

key to step through auto range and manual range.

Manual range: Press the  key to execute range increasing.

Press the  key to execute range decreasing.

Method 2 In the measurement interface, select the range by using the soft menu key, as shown in the following figure.

Automatic range: Press the [Auto] key to select the automatic range, and the manual range will be disabled.

Manual range: Press the range of [200 mV], [2 V], [20 V], [200 V], or [1000 V] to set the manual range (taking DC voltage measurement as an example), and the automatic range will be disabled.

Figure 2-1 Range Selection Menu

Notes

1. When the input signal exceeds the current range, the multimeter will prompt overload message "OL".
2. Except DCV 1000 V and ACV 750 V, all scales are allowed to exceed the range by 20%.
3. The range selection defaults to Auto, when the instrument is powered up, after a remote reset, and the default factory setting is enabled.
4. It is recommended that the user selects automatic range when the measurement range is unpredictable, that can protect the instrument and obtain more accurate data.
5. For the dual display function, the measurement ranges of the primary and secondary displays are similar and cannot be changed independently.
6. The ranges are fixed for testing connectivity and checking the diode. The range for continuity is 2 kΩ and the range for diode check is 4 V.
7. There are some special requirements for current range switching. The mA input terminal has a maximum range of 200 mA (including DCI and ACI, the following two points are the same), and A input terminal is used for 2 A and 10 A scale, so it the current exceeds 200 mA, that need to be input from A terminal, and if the current is smaller than 200 mA, it is recommended that input from mA terminal. There is no automatic switching between two different current inputs.
8. The current measurement is provided with overcurrent protection by two fuses.
9. The voltage measurement must not be overloaded for a long time, so as not to cause damage to the circuit.

Integral Time and Resolution

The integral time refers to the sampling period of the input signal by the instrument analog/digital converter during the measurement. The longer the integral time, the slower the measurement rate and the higher the measurement resolution; the shorter the integral time, the faster the measurement rate and the lower the measurement resolution. The integral time applies to the DCV, DCI, 2WR, and 4WR measurement functions.

UT8806E sets the integral time in terms of the number of power cycles, and the unit is PLC. The default integral time of the multimeter at power-on is 10 PLC, and the user can manually

select the integral time with 0.006 PLC, 0.02 PLC, 0.06 PLC, 0.2 PLC, 1 PLC, 10 PLC, and 100 PLC.

The reading resolution of the UT8806E can be $4\frac{1}{2}$, $5\frac{1}{2}$, or $6\frac{1}{2}$ digits. The multimeter automatically selects the reading resolution according to the current measurement settings.

1. For DCV, DCI and OHM measurement, select [Integral time] in the menu to see the setting options as shown in Figure 2-2(taking DCV measurement as an example). Press the corresponding menu key to realize the configuration. Setting the integral time will affect the resolution.

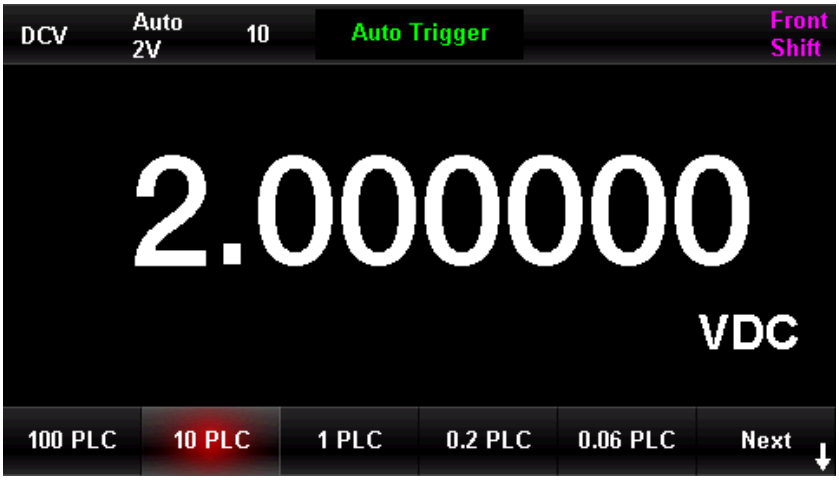


Figure 2-2 Integral time Menu

Table 2-1 Relation of Resolution and Integral Time

Resolution	Integral Time
$4\frac{1}{2}$	0.006 PLC
$5\frac{1}{2}$	0.2 PLC, 0.06 PLC, 0.02 PLC
$6\frac{1}{2}$	100 PLC, 10 PLC, 1 PLC

2. For ACV, ACI, and FREQ/PERIOD measurements, the resolution is fixed at $6\frac{1}{2}$ digits.

3. For FREQ/PERIOD measurement

Resolution	Gate Time
3 1/2	1 ms
4 1/2	10 ms

5 1/2	100 ms
6 1/2	1 s

4. For CAP measurement, the resolution is fixed at $4\frac{1}{2}$ digits.

5. For CONT measurement, it is always displayed to 2 decimal places.
6. For DIODE measurement, the resolution is fixed at $5\frac{1}{2}$ digits.
7. For TEMP measurement, the resolution is fixed at $5\frac{1}{2}$ digits.

RTD (2-wire, 4-wire) Thermistor (2-wire, 4-wire)	Always displayed to three decimal places.
Thermocouple (J, K, E, T, N)	Always displayed to 2 decimal places.
Thermocouple (R, S, B)	Always display to one decimal place.

Input Impedance

The input impedance setting applies to the DCV measurement function. The factory default is "Auto". For 200 mV, 2 V and 20 V scales, "10 MΩ" can be selected to minimize the load error introduced by the multimeter to the measured object.

Currently, the measurement function is DCV, and the range is Auto or 10 MΩ. Press the Menu key to set the **[Input Impedance]** in the menu, as shown in Figure 2-3Figure 2-3.

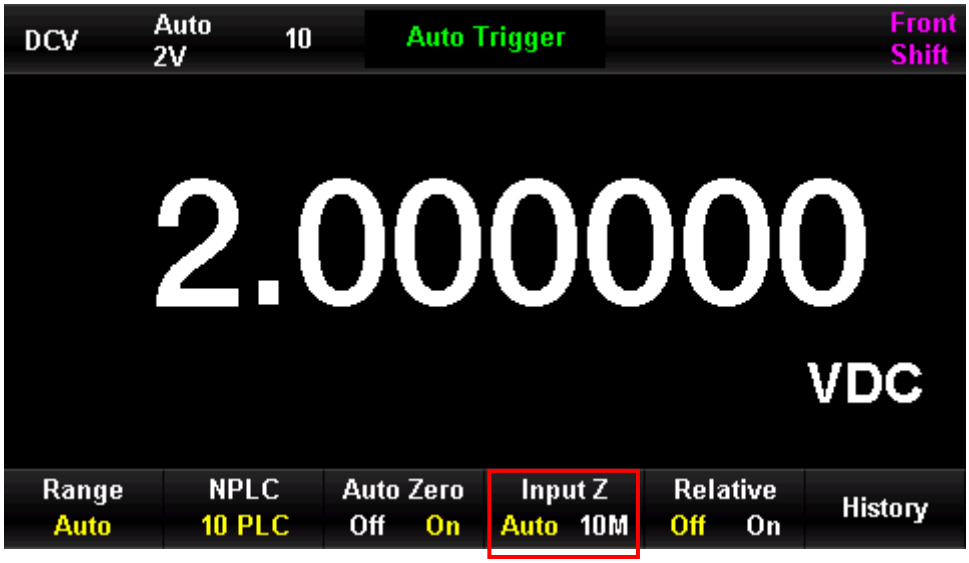


Figure 2-3 Select DC Impendence

Press **[Auto]** or **[10 MΩ]** to select the impedance value.

- Select "Auto", then the input impedance of all ranges is **greater than 10 GΩ.**
- Select "10 MΩ", then the input impedance of all ranges is **equal to 10 MΩ.**

Automatic Zeroing

Auto Zero is applicable to DCV, DCI, 2WR, and 4WR measurement functions.

After entering the measurement function, press the Menu key to set [Auto Zero] in the menu, as shown in Figure 2-4(taking DCV measurement as an example).

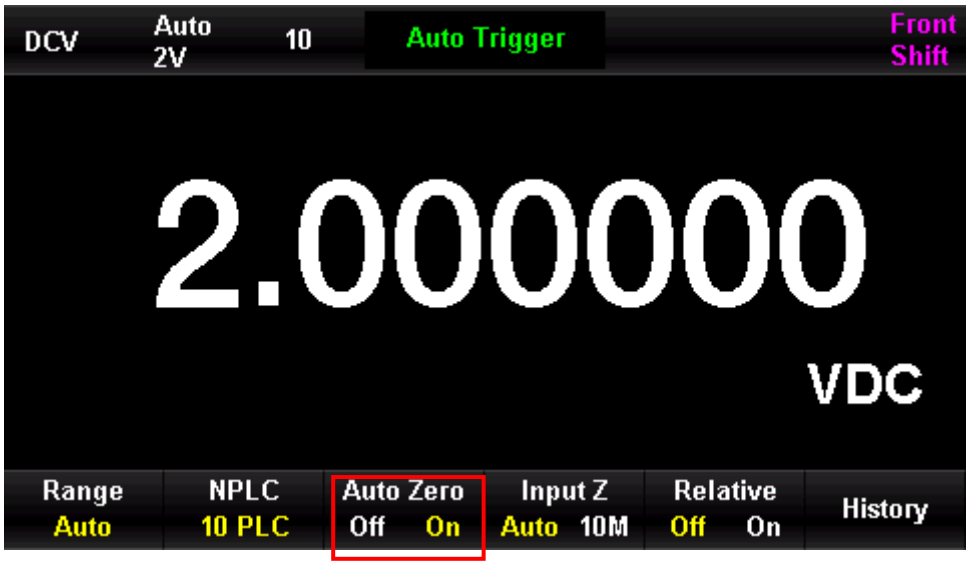


Figure 2-4 Auto Zero Setting

- When Auto Zero is set to "On", the multimeter separates the input signal from the measurement circuit after each measurement and takes a reading at zero input, then subtracts the previous reading from the reading at zero input (i.e., the displayed value is the difference between the measured value and the zero value during the measurement process), this is to minimize the effects of bias and thermoelectric potential on the instrument's input circuitry on the measurement results.

- Auto zero is set to "Off", the auto zero function will be turned off.

Low-frequency Filter

The low-frequency filter is applicable to ACV, ACI measurements. The low-frequency filter will optimize the low-frequency accuracy and minimize the AC stabilization time. UT8806E multimeter provides three kinds of low-frequency filters, >3 Hz, >20 Hz and >200 Hz.

During the measurement, the user should select the AC filter according to the frequency of the input signal. Normally, the user should select the highest frequency filter whose frequency is less than the frequency of the measurement signal.
For example, when measuring signals in the 20 Hz to 200 Hz range, use a 20 Hz filter. When measurement speed is not a major consideration, choosing a lower frequency filter for acquiring more stable measurement results depending on the signal to be measured.

During ACV, ACI measurements, selecting [Filter] in the menu, as shown in Figure 2-5 (taking ACV measurement as an example). Press the menu key to realize the configuration.

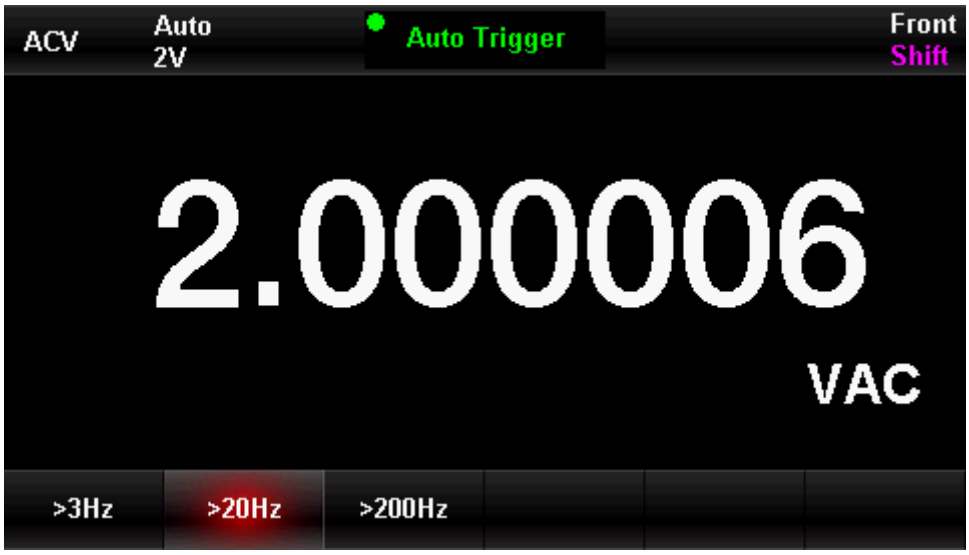


Figure 2-5 Low-frequency Filter Setting

Short-circuit Resistance

During the CONT measurement, the short-circuit resistance value should be set in the test circuit. When the resistance value of the measured resistor in the circuit is lower than the short-circuit resistance value, the circuit is judged to be connected, and beeper will sound an audible alarm (if the beeper is turned on). The factory default value of the short-circuit resistance is 50 Ω and is stored in non-volatile memory.

When the CONT measurement function is currently selected, use the arrow keys to enter the desired [Threshold] (i.e. short circuit resistance). The settable range is from 0 Ω to 2000 Ω as illustrated below.

Figure 2-6 Short-circuit Resistance Setting

Notes

When setting the threshold, press the key to select digit, and press the key to select the numeric value.

Diode Break-over Voltage

For the diode conduction measurement, it is necessary to set the break-over voltage in the test circuit. When the on-state voltage value of the diode in the circuit under test is lower than the set value, the instrument continuously emits a beep tone (if the beeper is turned on). The factory default value for the on-state voltage is 2 V and is stored in non-volatile memory.

Figure 2-7 Diode Break-over Voltage Measurement

Measuring Interval

The measurement interval applies to the FREQ/PERIOD measurement function. The length of the measurement interval determines the resolution of the low-frequency measurement. The longer the interval time, the higher the low-frequency measurement resolution and the lower the measurement rate; conversely, the lower the low-frequency measurement resolution and the higher the measurement rate.

During the FREQ/PERIODI measurements, select [Measuring Interval] in the menu, the user can set the measurement interval as 1 ms, 10 ms, 100 ms, or 1 s, with the default set to 100 ms. as illustrated below (taking FREQ measurement as an example), press the menu key to configure the setting.

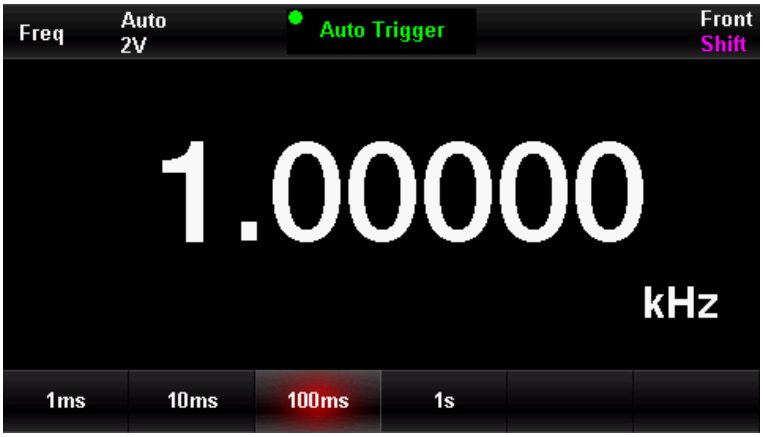


Figure 2-8 Measuring Interval Setting

Basic Measurement

- DC Voltage Measurement
- DC Current Measurement
- AC Voltage Measurement
- AC Current Measurement
- 2-wire or 4-wire Resistance Measurement
- Capacitance Measurement
- Frequency Measurement
- Signal Period Measurement
- Continuity Measurement
- Diode Measurement
- Temperature Measurement

DC Voltage Measurement

UT8806E can measure DC voltage up to 1000 V. The DC voltage measurement function is selected by default after powering on, and the connection and measurement method of DC voltage will be described in detail below.

Operation Steps

1. Press the DCV key to enter the DC voltage measurement menu, as illustrated below.

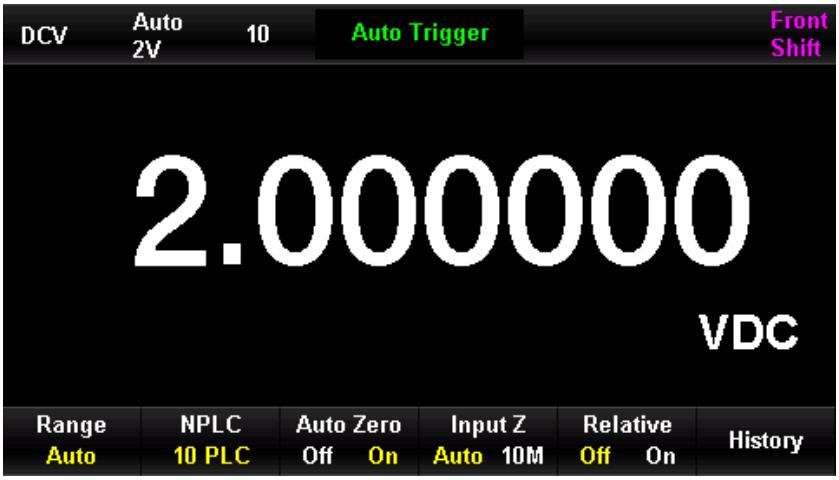


Figure 2-9 DC Voltage Measurement Menu

2. As shown in Figure 2-10, connect the test leads to the voltage to be measured, the red test lead to the "HI" terminal of the input jack and the black test lead to the "LO" terminal of the input jack.

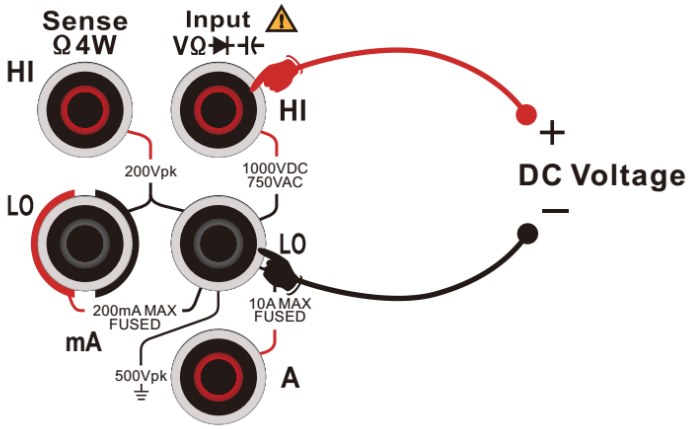


Figure 2-10 Measuring Connection of DC Voltage

3. Select the appropriate range according to the size of the input DC voltage.

The user can press [Range] to select a measuring range or use the front panel keys  to quickly select a range. The automatic range automatically selects a range for the measurement based on the input. Compared to the manual range, the automatic range is more convenient, but the measurement speed is slower.

Table 2-2

Range*	200 mV, 2 V, 20 V, 200 V, 1000 V
Input Protection	All scales are DC 1000 V or AC 750 Vrms (Hi end)
Configuration Parameter	Range, input impedance, reading rate, the set value of relative operation

Notes*

- Except 1000 V, all ranges are allowed to over range by 20%.
- "OL" will be displayed when the input exceeds 1050 V in 1000 V range.
- Input protection of 1000 V is for every range.

4. Set DC input impedance (only for 20 V and the below scale)
   The input impedance has "Auto" and "10 M" two options, in 20 V and below scale, "Auto" that indicates the input resistance is greater than 10 GΩ, the input resistance is 10 MΩ in other cases.

5. Set the integral time
   Press the [Integral time] to select an integral time for the measurement. Selecting 100 PLC, it provides the best noise rejection and resolution, but the slowest measurement speed.

6. Set automatic zeroing
   Press the [Auto Zero] to enable or disable this function. Auto zero provides the most accurate measurements but requires additional time to perform the zeroing measurement. When auto-zero is enabled, the multimeter will take an internal measurement of the offset after each measurement. This measurement will subtract its measured value from the previous reading. In this way, the offset voltage on the input circuit of the multimeter affects the measurement accuracy can be avoided.

7. Set the relative value
   Turn on or off the relative operation function. When the relative operation is turned on, the displayed number is the actual measured value minus the set relative value. (For

details on how to set the relative value, refer to the section "Mathematical Operation Function" in this chapter).

8. Read the measured results
   The multimeter will measure the input signal according to the current measurement settings and display the measurement results on the screen.

9. Mathematical operation
   The user can perform mathematical operations (statistics, limit, dBm, dB, relative) on DCV measurement readings. For details on how to use this function, refer to the section *Mathematical Operation Function* in this chapter.

10. Graphical display
    The user can change the display mode of the measured data via **[Display]**. There are four display modes: Digital, Bar, Tendency, and Histogram. For details, please refer to the *Display Mode* section.

Notes

Before the voltage signal is connected, the multimeter input jacks are left open and random readings within ±20 V will occur.

DC Current Measurement

UT8806E can measure DC current up to 10 A. The connection and measurement method of DC current will be described in detail below.

Operation Steps

1. Press the 

key on the front panel, and then press 

key to enter the DC current measurement menu, as illustrated below.

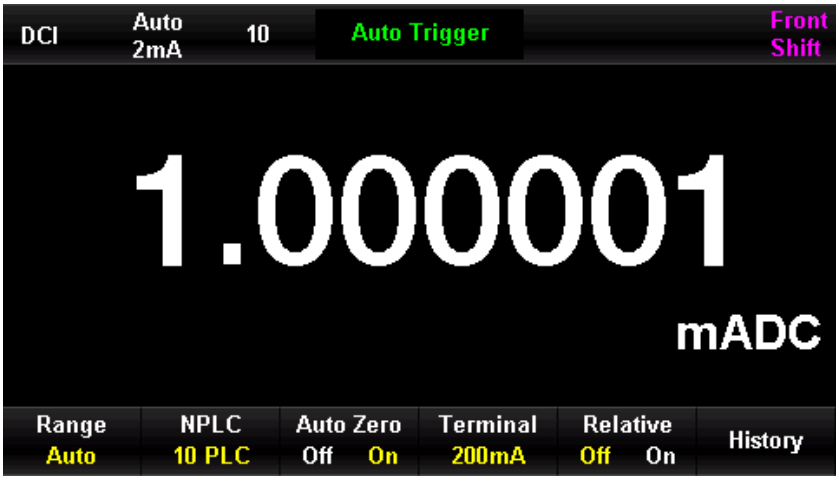


Figure 2-11 DC Current Measurement Menu

2. As illustrated below, connect the multimeter to the test circuit. When the current is small, the red test lead is connected to the mA input terminal and the black test lead is connected to the Input-LO input terminal. When the current is large, the red test lead is connected to the A input terminal and the black test lead is connected to the Input-LO input terminal.

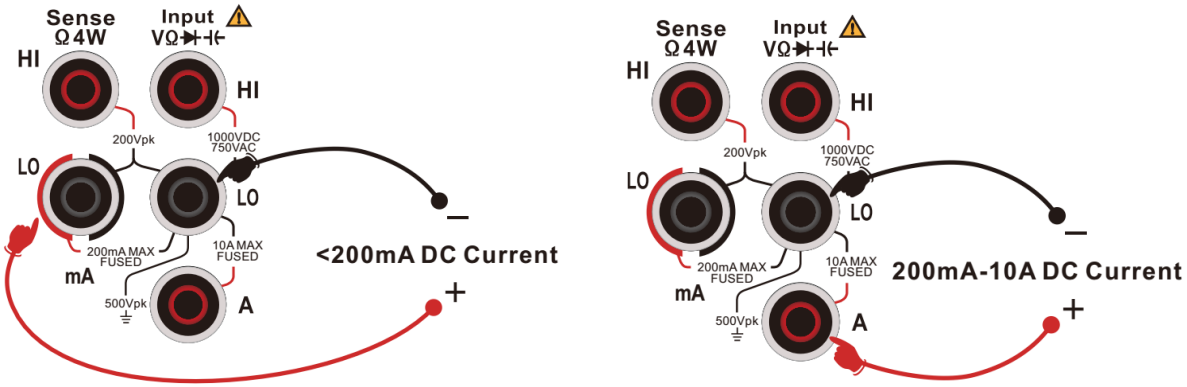


Figure 2-12 Measuring Connection of DC Current

3. Select the appropriate current range according to the size of the input current.

   The user can press [Range] to select a measuring range or use the front panel keys to quickly select a range. The automatic range automatically selects a range for the measurement based on the input. Compared to the manual range, the automatic range is more convenient, but the measurement speed is slower.

Table 2-3

Range*	2 μA, 20 μA, 200 μA, 2 mA, 20 mA, 200 mA, 2 A,10 A

Input Protection	200 mA and below range 250 mA overcurrent protection (rear panel); 2 A and 10 A scale in machine 10 A built-in protection
Configuration Parameter	Range, reading rate, the set value of relative operation

Notes*

- Except 10 A, all ranges are allowed to over range by 20%.
- "OL" will be displayed when the input exceeds the maximum range.

4. Set the relative value
   Turn on or off the relative operation function. When the relative operation is turned on, the displayed number is the actual measured value minus the set relative value. (For details on how to set the relative value, refer to the section "Mathematical Operation Function" in this chapter).
5. Set the integral time
   Press the **[Integral time]** to select an integral time for the measurement. Selecting 100 PLC, it provides the best noise rejection and resolution, but the slowest measurement speed.
6. Set automatic zeroing
   Press the **[Auto Zero]** to enable or disable this function. Auto zero provides the most accurate measurements but requires additional time to perform the zeroing measurement. When auto-zero is enabled, the multimeter will take an internal measurement of the offset after each measurement. This measurement will subtract its measured value from the previous reading. In this way, the offset voltage on the input circuit of the multimeter affects the measurement accuracy can be avoided.
7. Mathematical operation
   The user can perform mathematical operations (statistic, limit, relative) on DCI measurement readings. For details on how to use this function, refer to the section *Mathematical Operation Function* in this chapter.
8. Read the measured results
   When reading the measured results, press **[Speed]** to select the appropriate reading rate.
9. Graphical display
   The user can change the display mode of the measured data via **[Display]**. There are four display modes: Digital, Bar, Tendency, and Histogram. For details, please refer to the *Display Mode* section.

AC Voltage Measurement

UT8806E can measure AC voltage up to 750 V. The connection and measurement method of AC voltage will be described in detail below.

Operation Steps

1. Press the ACV key on the front panel to enter the AC voltage measurement menu, as illustrated below.

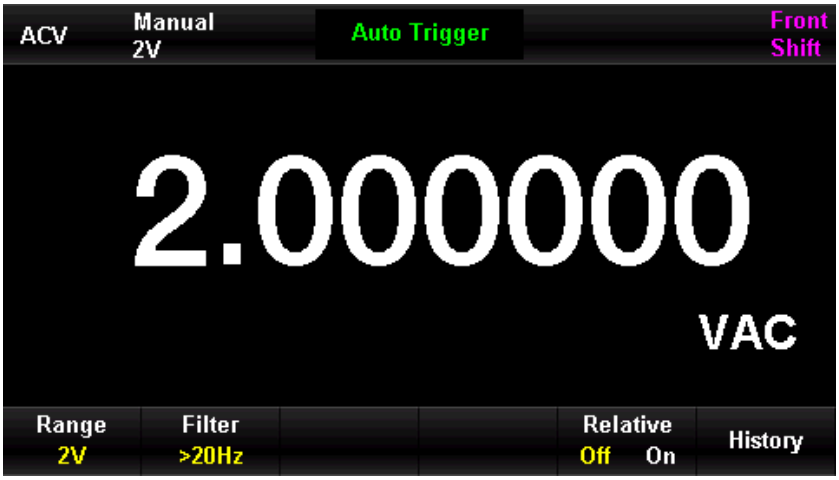


Figure 2-13 AC Voltage Measurement Menu

2. As illustrated below, connect the test leads to the voltage to be measured, the red test lead to the "HI" terminal of the input jack and the black test lead to the "LO" terminal of the input jack.

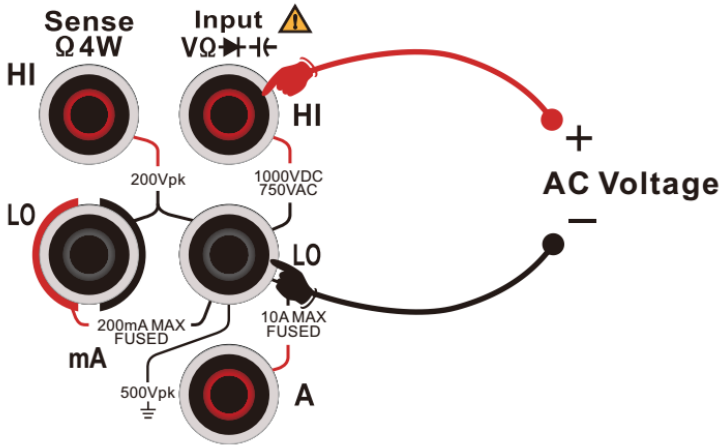


Figure 2-14 Measuring Connection of AC Voltage

3. Select the appropriate range according to the size of the input AC voltage.

The user can press [Range] to select a measuring range or use the front panel keys to quickly select a range. The automatic range automatically selects a range for the measurement based on the input. Compared to the manual range, the automatic range is more convenient, but the measurement speed is slower.

Table 2-4

Range*	200 mV, 2 V, 20 V, 200 V, 750 V
Input Protection	All scales are DC 1000 V or AC 750 Vrms (Hi end)
Configuration Parameter	Range, filter, reading rate, the set value of relative operation

Notes*

- Except 750 V, all ranges are allowed to over range by 20%.
- "OL" will be displayed when the input exceeds 787 V in 750 V range.
- Input protection of 750 Vrms applies to all ranges.

4. Set the filter

   Press the **[Filter]** to configure an appropriate filter for measurement. UT8806E provides three kinds of filter, ">3 Hz, >20 Hz and >200 Hz". Normally, the user should select the highest frequency filter whose frequency is less than the frequency of the measurement signal.

5. Set the relative value

   Turn on or off the relative operation function. When the relative operation is turned on, the displayed number is the actual measured value minus the set relative value. (For details on how to set the relative value, refer to the section "Mathematical Operation Function" in this chapter).

6. Read the measured results

   When reading the measured results, if press the 

key, set **[Dual]** to Frequency, it can get the frequency of measured signal, as illustrated below.

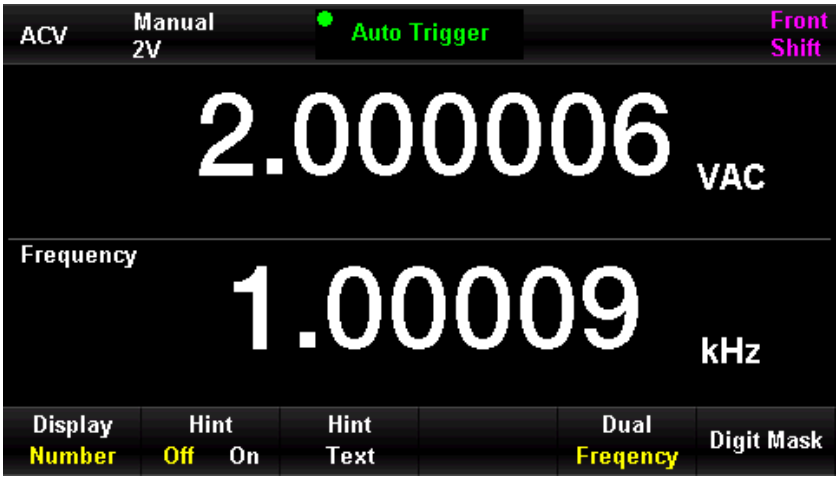


Figure 2-15 Measurement Menu of AC Voltage and Frequency

10. Graphical display

    The user can change the display mode of the measured data via **[Display]**. There are four display modes: Digital, Bar, Tendency, and Histogram. For details, please refer to the *Display Mode* section.

AC Current Measurement

UT8806E can measure AC current up to 10 A. The connection and measurement method of DC current will be described in detail below.

Operation Steps

1. Press the Shift key on the front panel, and then press DCV key to enter the AC current measurement menu, as illustrated below.

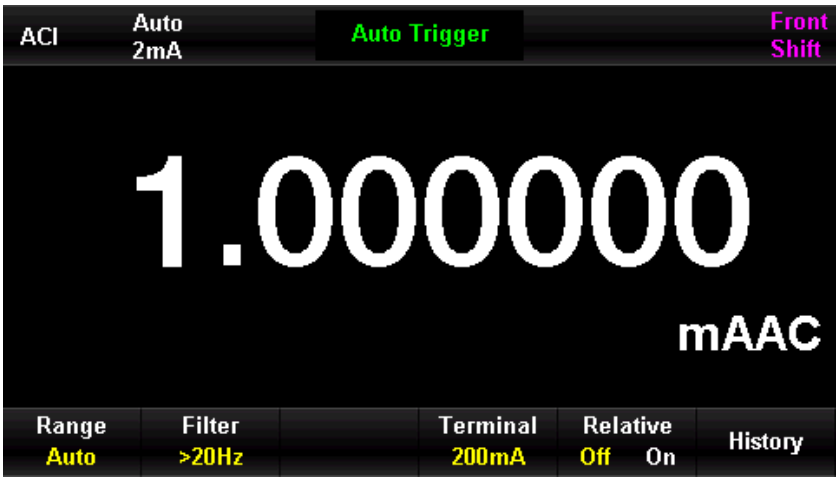


Figure 2-16 AC Current Measurement Menu

2. As illustrated below, connect the multimeter to the test circuit. When the current is small, the red test lead is connected to the mA input terminal and the black test lead is connected to the Input-LO input terminal. When the current is large, the red test lead is connected to the A input terminal and the black test lead is connected to the Input-LO input terminal.

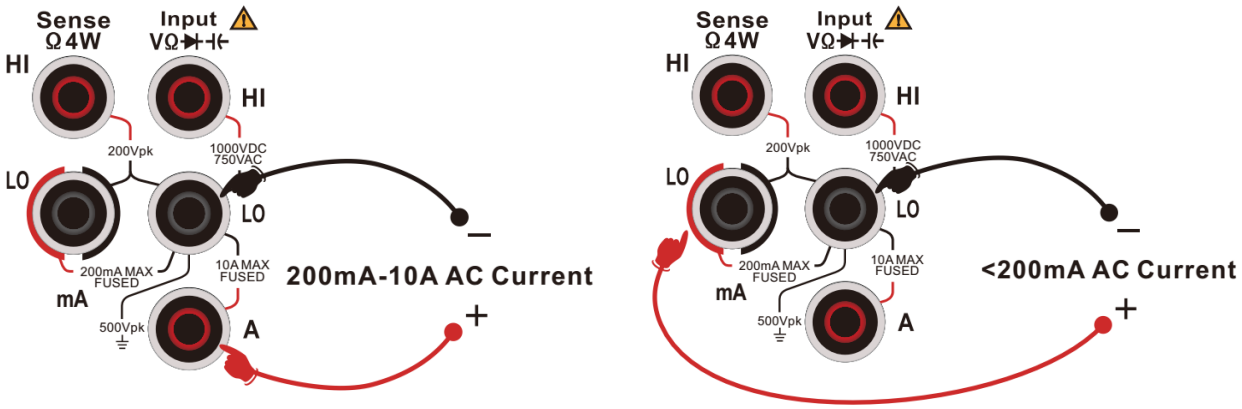


Figure 2-17 Measuring Connection of AC Current

3. Select the appropriate current range according to the size of the input range.

The user can press [Range] to select a measuring range or use the front panel keys to quickly select a range. The automatic range automatically selects a range for the measurement based on the input. Compared to the manual range, the automatic range is more convenient, but the measurement speed is slower.

Table 2-5

Range*	200 μA, 2 mA, 20 mA, 200 mA, 2 A,10 A
Input Protection	200 mA and below range 250 mA overcurrent protection (rear panel); 2 A and 10 A scale in machine 10 A built-in protection
Configuration Parameter	Range, reading rate, the set value of relative operation

Notes*

- Except 10 A, all ranges are allowed to over range by 20%.
- "OL" will be displayed when the input exceeds the maximum range.

4. Set the filter

Press the [Filter] to configure an appropriate filter for measurement. UT8806E provides three kinds of filter, ">3 Hz, >20 Hz and >200 Hz". Normally, the user should select the highest frequency filter whose frequency is less than the frequency of the measurement signal.

5. Set the relative value

   Turn on or off the relative operation function. When the relative operation is turned on, the displayed number is the actual measured value minus the set relative value. (For details on how to set the relative value, refer to the section "Mathematical Operation Function" in this chapter).

6. Read the measured results

   When reading the measured results, if press the 

key, set [Dual] to Frequency, it can get the frequency of measured signal, as illustrated below.

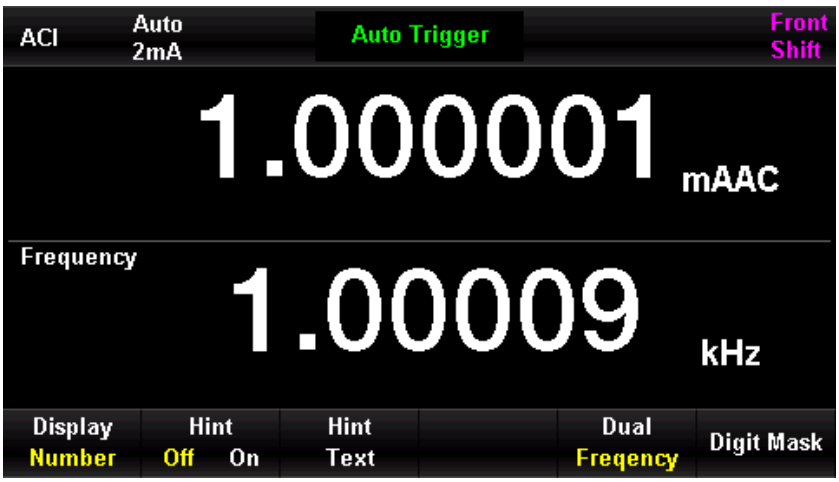


Figure 2-18 Dual Display of AC Current

7. Graphical display

   The user can change the display mode of the measured data via [Display]. There are four display modes: Digital, Bar, Tendency, and Histogram. For details, please refer to the *Display Mode* section.

Resistance Measurement

UT8806E supports two resistance measurements: 2-wire and 4-wire. The connection and resistance measurement method of 2-wire and 4-wire will be described in detail below.

2-wire Resistance Measurement

Operation Steps

1. Press the Ω2W key on the front panel to enter 2-wire resistance measurement menu, as illustrated below.

Figure 2-19 2-wire Resistance Measurement Menu

2. As illustrated below, connect the test leads to the resistance to be measured, the red test lead to the "HI" terminal of the input jack and the black test lead to the "LO" terminal of the input jack.

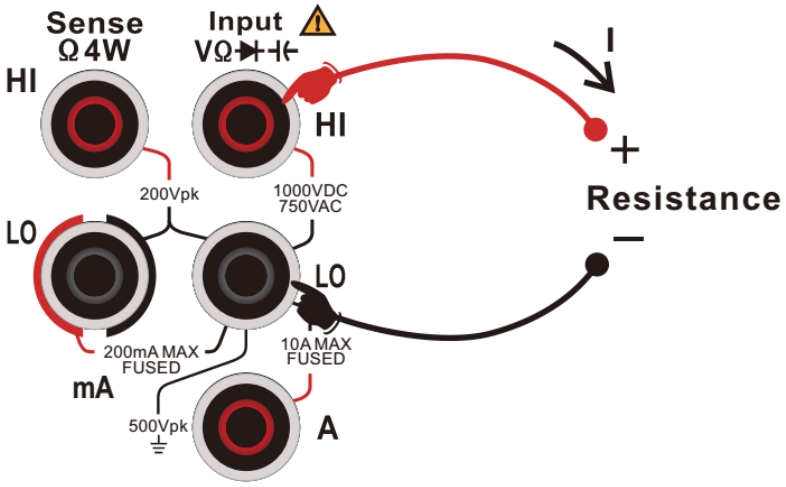


Figure 2-20 Measuring Connection of 2-wire Resistance Measurement

3. Select the appropriate current range according to the size of the resistance to be measured.

   The user can press [Range] to select a measuring range or use the front panel keys  to quickly select a range. The automatic range automatically selects a range for the measurement based on the input. Compared to the manual range, the automatic range is more convenient, but the measurement speed is slower.

Table 2-6

Range*	200 Ω, 2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ,10 MΩ,100 MΩ, 1 GΩ
Open-circuit voltage	< 8V
Input Protection	All scales are DC 1000 V or AC 750 Vrms (Hi end)
Configuration Parameter	Range, integral time, automatic zeroing, reading rate, the set value of relative operation

Notes*

- All ranges are allowed to over range by 20%.
- "OL" will be displayed when the maximum range.

4. Set the relative value

   Turn on or off the relative operation function. When the relative operation is turned on, the displayed number is the actual measured value minus the set relative value. (For details on how to set the relative value, refer to the section "Mathematical Operation Function" in this chapter).

5. Set the integral time

   Press the [Integral time] to select an integral time for the measurement. Selecting 100 PLC, it provides the best noise rejection and resolution, but the slowest measurement speed.

6. Set automatic zeroing

   Press the [Auto Zero] to enable or disable this function. Auto zero provides the most accurate measurements but requires additional time to perform the zeroing measurement. When auto-zero is enabled, the multimeter will take an internal measurement of the offset after each measurement. This measurement will subtract its measured value from the previous reading. In this way, the offset voltage on the input circuit of the multimeter affects the measurement accuracy can be avoided.

7. Set the relative value

   Turn on or off the relative operation function. When the relative operation is turned on, the displayed number is the actual measured value minus the set relative value. (For details on how to set the relative value, refer to the section "Mathematical Operation Function" in this chapter).

8. Graphical display

   The user can change the display mode of the measured data via **[Display]**. There are four display modes: Digital, Bar, Tendency, and Histogram. For details, please refer to the *Display Mode* section.

9. Mathematical operation

   The user can perform mathematical operations (statistic, limit, relative) on DCI measurement readings. For details on how to use this function, refer to the section *Mathematical Operation Function* in this chapter.

Notes

When measuring small resistors, it is recommended to use relative value calculation, which can eliminate test wire impedance errors.

4-wire Resistance Measurement

When the measured resistance is small, the resistance of the leads and the contact resistance in the test circuit can lead to additional errors, so a 4-wire system is necessary for more accurate measurements.

Operation Steps

1. Press the 

key on the front panel, and then press 

key to enter the 4-wire resistance measurement menu, as illustrated below.

Figure 2-21 4-wire Resistance Measurement Menu

2. As illustrated below, connect the test lead to the resistance to be measured. The red test lead is connected to the input jack "HI" end, the black test lead is connected to the input jack "LO" end, the above two test lines are constant current source output circuit; the red test lead is connected to the input jack "HI Sense" end, the black test lead is connected to the input jack.

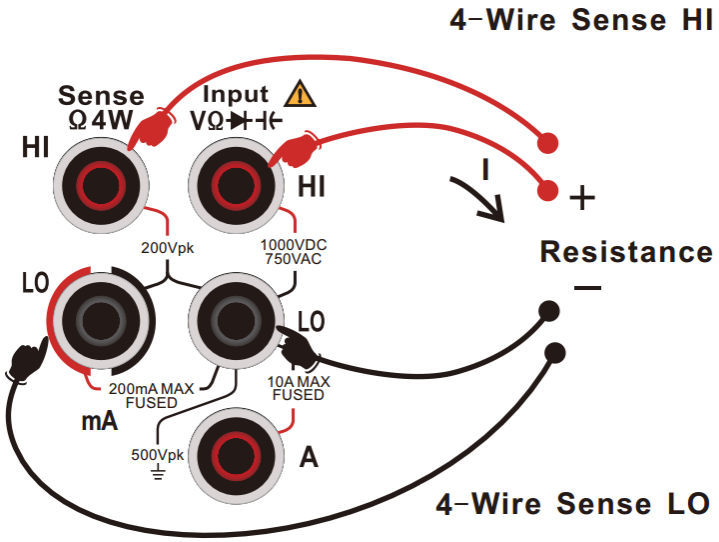


Figure 2-22 Measuring Connection of 4-wire Resistance Measurement

3. Select the appropriate current range according to the size of the resistance to be measured.

   The user can press [Range] to select a measuring range or use the front panel keys  to quickly select a range. The automatic range automatically selects a range for the measurement based on the input. Compared to the manual range, the automatic range is more convenient, but the measurement speed is slower.

Table 2-7

Range*	20 Ω, 200 Ω, 2 kΩ, 20 kΩ, 200 kΩ, 2 mΩ
Open-circuit voltage	<8 V
Input Protection	All scales are DC 1000 V or AC 750 Vrms (Hi end) All scales are DC 200 V (Sense HI end and Sense LO end)
Configuration Parameter	Range, integral time, automatic zeroing, the set value of relative operation

Notes*

- All ranges are allowed to over range by 20%.
- "OL" will be displayed when the maximum range.

4. Set the integral time

   Press the **[Integral time]** to select an integral time for the measurement. Selecting 100 PLC, it provides the best noise rejection and resolution, but the slowest measurement speed.

5. Set automatic zeroing

   Press the **[Auto Zero]** to enable or disable this function. Auto zero provides the most accurate measurements but requires additional time to perform the zeroing measurement. When auto-zero is enabled, the multimeter will take an internal measurement of the offset after each measurement. This measurement will subtract its measured value from the previous reading. In this way, the offset voltage on the input circuit of the multimeter affects the measurement accuracy can be avoided.

6. Set the relative value

   Turn on or off the relative operation function. When the relative operation is turned on, the displayed number is the actual measured value minus the set relative value. (For details on how to set the relative value, refer to the section "Mathematical Operation Function" in this chapter).

7. Graphical display

   The user can change the display mode of the measured data via **[Display]**. There are four display modes: Digital, Bar, Tendency, and Histogram. For details, please refer to the *Display Mode* section.

Notes

- When measuring resistance, please avoid short-circuiting the measured object by conductive bodies such as anti-static rubber, copper foil, etc. and keep away from strong electromagnetic radiation.
- Four-wire resistance measurements will give random readings if the inputs are dangling.

Capacitance Measurement

UT8806E can measure capacitance up to 100 mF. The connection and measurement method of capacitance will be described in detail below.

Operation Steps

1. Press the key on the front panel to enter the capacitance measurement menu, as illustrated below.

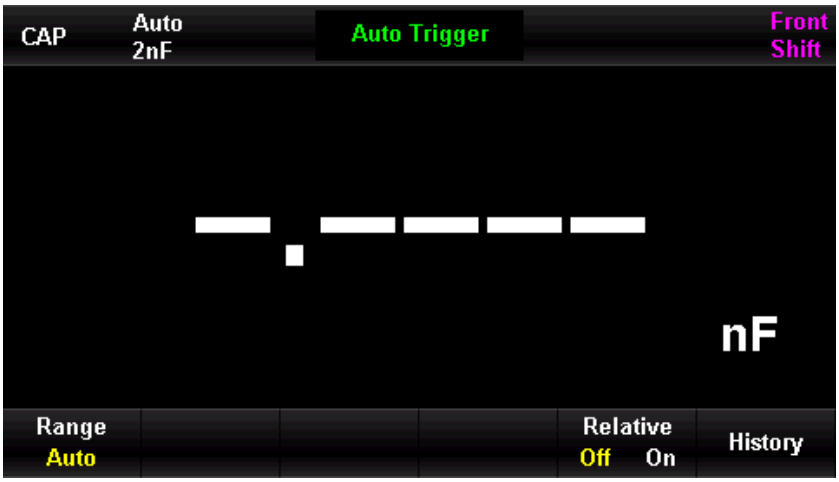


Figure 2-23 Capacitance Measurement Menu

2. As illustrated below, connecting the test leads to both ends of the capacitor under test, the red test lead to the Input-HI terminal and the positive terminal of the capacitor, and the black test lead to the Input-LO terminal and the negative terminal of the capacitor.

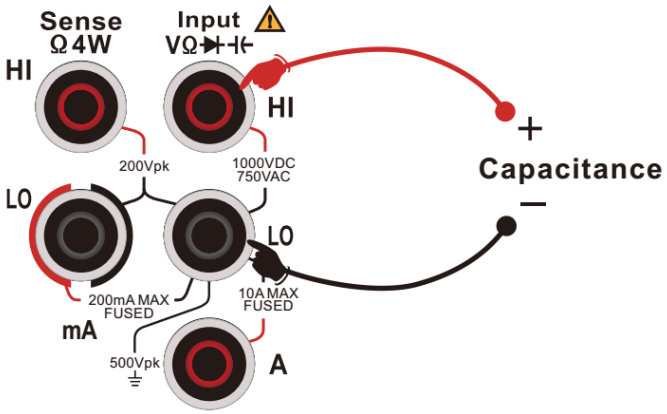


Figure 2-24 Measuring Connection of Capacitance Measurement

3. Select the appropriate range according to the size of the capacitance to be measured.

The user can press [Range] to select a measuring range or use the front panel keys  to quickly select a range. The automatic range automatically selects a range for the measurement based on the input. Compared to the manual range, the automatic range is more convenient, but the measurement speed is slower.

Table 2-8

Range*	2 nF, 20 nF, 200 nF, 2 μF, 20 μF, 200 μF, 2 mF, 20 mF, 100 mF
Input Protection	All scales are DC 1000 V or AC 750 Vrms (Hi)
Configuration Parameter	Range, the set value of relative operation

Notes*

- All ranges are allowed to over range by 20%.
- "OL" will be displayed when the maximum range.

4. Set the relative value

   Turn on or off the relative operation function. When the relative operation is turned on, the displayed number is the actual measured value minus the set relative value. (For details on how to set the relative value, refer to the section "Mathematical Operation Function" in this chapter).

5. Mathematical operation

   The user can perform mathematical operations (statistic, limit, relative) on DCI measurement readings. For details on how to use this function, refer to the section *Mathematical Operation Function* in this chapter.

6. Read the measured results

   The refresh rate of measured value depends on the measured capacitance value.

7. Graphical display

   The user can change the display mode of the measured data via [Display]. There are four display modes: Digital, Bar, Tendency, and Histogram. For details, please refer to the *Display Mode* section.

Operation Notes

Before the multimeter measuring a large-capacity electrolytic capacitor, the capacitor needs to be discharged first, and then it can be measured.

Frequency Measurement

When measuring AC voltage, the user can read the frequency value by turning on the dual display function; and it can also get the same frequency reading in the frequency measurement. The signal frequency connection and test method will be described in detail below.

Test Steps

1.Press the Hz key on the front panel to enter the signal frequency measurement menu, as illustrated below.

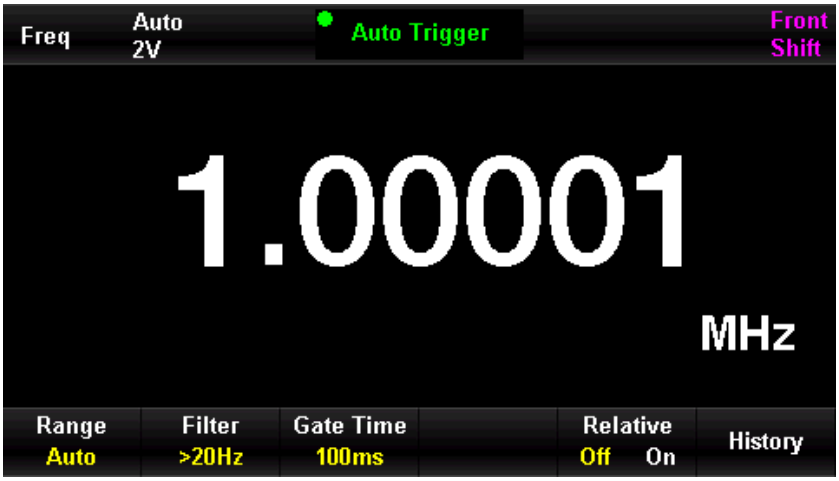


Figure 2-25 Signal Frequency Measurement Menu

2.As illustrated below, connect the test leads to the signal to be measured, the red test lead to the "Input-HI" terminal and the black test lead to the "Input-LO" terminal.

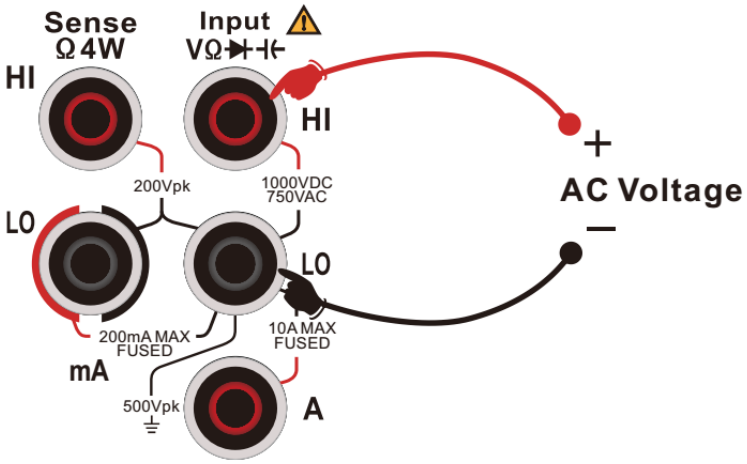


Figure 2-26 Measuring Connection of Signal Frequency

3.Select the appropriate range according to the size of the AC voltage.

The user can press [Range] to select a measuring range or use the front panel keys  to quickly select a range. The automatic range automatically selects a range for the measurement based on the input. Compared to the manual range, the automatic range is more convenient, but the measurement speed is slower.

Table 2-9

Voltage Scale	200 mV, 2 V, 20 V, 200 V, 750 V
Input Protection	All scales are DC 1000 V or AC 750 Vrms (Hi)
Configuration Parameter	Voltage scale, measuring interval, the set value of relative operation

4.Set the relative value

Turn on or off the relative operation function. When the relative operation is turned on, the displayed number is the actual measured value minus the set relative value. (For details on how to set the relative value, refer to the section "Mathematical Operation Function" in this chapter).

5.Set the measuring interval

Press the [Measuring Interval] to select 1 ms, 10 ms, 100 ms or 1 s. The multimeter selects 100ms by default.

6.Read the measured results

The reading rate of a frequency measurement depends on the frequency level of the signal being measured. The multimeter displays the current measurement and the result on the screen.

7.Mathematical operation

The user can perform mathematical operations (statistic, limit, relative) on measured readings. For details on how to use this function, refer to the section *Mathematical Operation Function* in this chapter.

8.Graphical display

The user can change the display mode of the measured data via [Display]. There are four display modes: Digital, Bar, Tendency, and Histogram. For details, please refer to the *Display Mode* section.

Signal Period Measurement

When measuring AC voltage, the user can read the frequency value by turning on the dual display function; and it can also get the same frequency reading in the frequency measurement. The connection and test method of signal period measurement will be described in detail below.

Test Steps

1. Press the Shift key on the front panel, and then press the Hz key to enter the signal period measurement menu, as illustrated below.

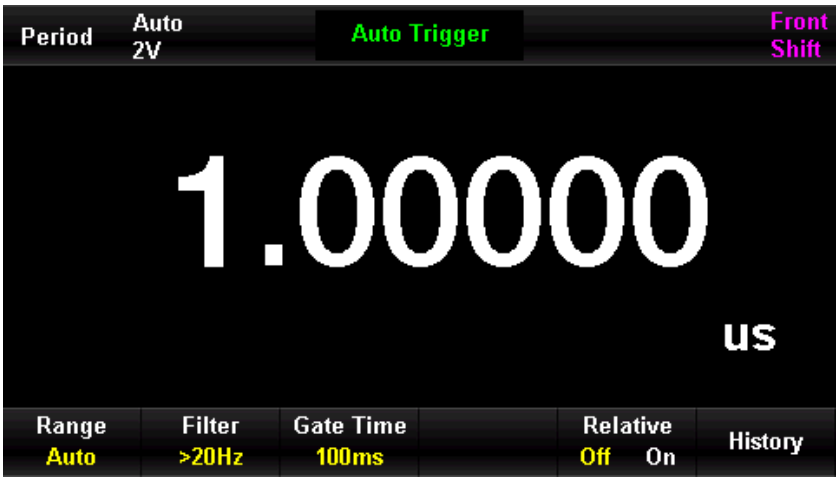


Figure 2-27 Signal Period Measurement Menu

2. As illustrated below, connect the test leads to the signal to be measured, the red test lead to the "Input-HI" terminal and the black test lead to the "Input-LO" terminal.

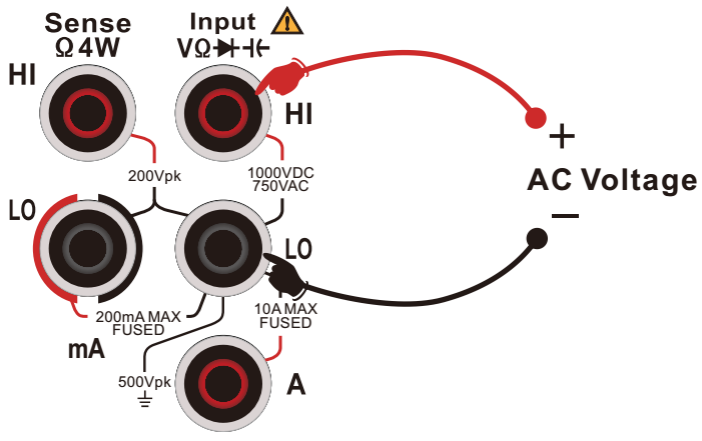


Figure 2-28 Measuring Connection of Signal Period

3. Select the appropriate range according to the size of the AC voltage.

Table 2-10

Voltage Scale	200 mV, 2 V, 20 V, 200 V, 750 V
Input Protection	All ranges are 750 Vrms (Hi end)
Configuration Parameter	Voltage scale, measuring interval, the set value of relative operation

4. Set the relative value

   Turn on or off the relative operation function. When the relative operation is turned on, the displayed number is the actual measured value minus the set relative value. (For details on how to set the relative value, refer to the section "Mathematical Operation Function" in this chapter).

5. Read the measured results

   The reading rate of a signal period measurement depends on the frequency level of the signal being measured.

6. Set the measuring interval

   Press the **[Measuring Interval]** to select 1 ms, 10 ms, 100 ms or 1 s. The multimeter selects 100ms by default.

7. Mathematical operation

   The user can perform mathematical operations (statistic, limit, relative) on measurement readings. For details on how to use this function, refer to the section *Mathematical Operation Function* in this chapter.

8. Graphical display

   The user can change the display mode of the measured data via **[Display]**. There are four display modes: Digital, Bar, Tendency, and Histogram. For details, please refer to the *Display Mode* section.

Continuity Measurement

The continuity test measures the resistance of the circuit under test with a current of approximately 1 mA by using the 2-wire method and determines whether the circuit is complete. When the measured resistance value in the short-circuit test circuit is lower than the set short-circuit resistance, the instrument determines that the circuit is connected, and the beeper emits a continuous beep (if the beeper is turned on). The following section describes how to use the UT8806E multimeter to perform a continuity test on a circuit.

Test Steps

1. Press the  key on the front panel to enter the continuity measurement menu, as illustrated below.

Figure 2-29 Continuity Measurement Menu

2. As illustrated below, connect the test leads to the signal to be measured, the red test lead to the "Input-HI" terminal and the black test lead to the "Input-LO" terminal.

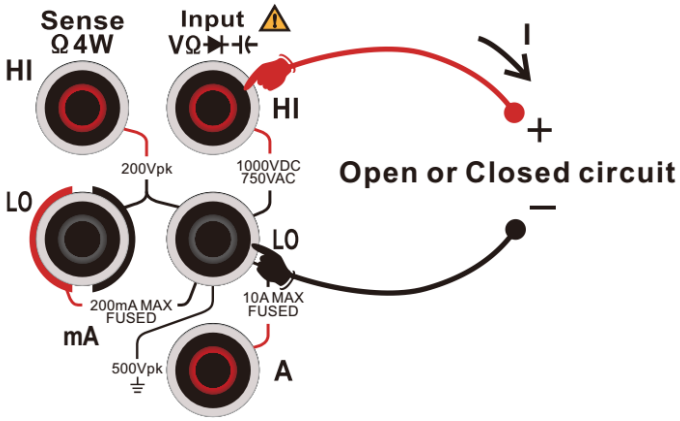


Figure 2-30 Measuring Connection of Continuity Measurement

3. Set short-circuit resistance (threshold)

   The default value of the short-circuit resistance is 30 Ω, which is set at the factory. The short-circuit resistance can be set by using the arrow keys. The user can directly carry out the continuity test. If the parameter does not need to modify this parameter, it can directly execute the next step.

Table 2-11 Feature of Continuity Measurement

Measuring Current	1 mA
Range	Fixed to 2 kΩ
Open-circuit voltage	< 8V
Input Protection	DC 1000 V or AC 750 Vrms (HI end)
Beeper Condition	0 ≤ R ≤ the set value

4. Set the beeper

   Press the **[Beeper]** to turn on/off this function. When the beeper function is turned on, if it is connected, the beeper will continually sound audible alarm.

5. The multimeter measures the input signal according to the current measurement settings and displays the measurement result on the screen.

6. Mathematical operation
7. The user can perform mathematical operations (statistic, limit, relative) on measurement readings. For details on how to use this function, refer to the section *Mathematical Operation Function* in this chapter.

8. Graphical display

   The user can change the display mode of the measured data via **[Display]**. There are four display modes: Digital, Bar, Tendency, and Histogram. For details, please refer to the *Display Mode* section.

Operation Notes

Before testing the on-off circuit, please disconnect the circuit power and discharge the high voltage capacitor to avoid damaging the multimeter.

Diode Measurement

The diode test measures the break-over voltage of the circuit under test with a current of approximately 1 mA by using the 2-wire method. The following section describes how to use the UT8806E multimeter to perform a diode test on a circuit.

Test Steps

1. Press the Shift key on the front panel, and then press key to enter the diode measurement menu, as illustrated below.

Figure 2-31 Diode Measurement Menu

2. As illustrated below, connect the test leads and the circuit under test, the red test lead to the "Input-HI" terminal and the black test lead to the "Input-LO" terminal.

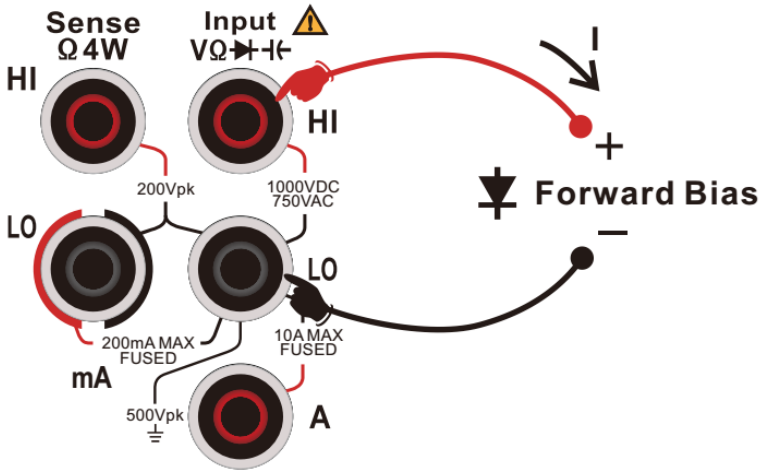


Figure 2-32 Measuring Connection of Diode Measurement

Table 2-12 Feature of Diode Measurement

Measuring Current	≈1 mA
Range	0 to 5V, "Open" will display when the range exceeds 5V
Open-circuit voltage	≈ 10V
Input Protection	DC 1000 V or AC 750 Vrms (HI end)

2. Detect the test point and read the displayed value.

3. Mathematical operation

   The user can perform mathematical operations (statistic, limit, relative) on measurement readings. For details on how to use this function, refer to the section *Mathematical Operation Function* in this chapter.

4. Graphical display

   The user can change the display mode of the measured data via **[Display]**. There are four display modes: Digital, Bar, Tendency, and Histogram. For details, please refer to the *Display Mode* section.

Operation Notes

Before testing the on-off circuit, please disconnect the circuit power and discharge the high voltage capacitor to avoid damaging the multimeter.

Temperature Measurement

UT8806E multimeter supports two temperature measurements: thermocouple and thermal resistance. The connection and measurement of temperature will be described in detail below.

Test Steps

1. Press the Shift key on the front panel, and then press key to enter the temperature measurement, as illustrated below.

Figure 2-33 Temperature Measurement Menu

2. As illustrated below, connect the test lead to the sensor.
   Notes: The thermocouple probe has polarity, do not connect it reversely.

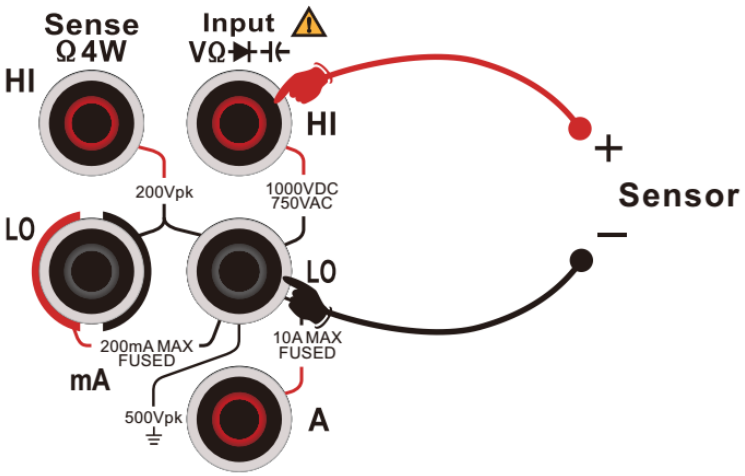


Figure 2-34 Measuring Connection of Temperature Measurement

3. Select temperature probe

   Press the [Probe] to select the desired probe, UT8806E supports 2-wire RTD, 4-wire RTD, 2-wire thermistor, 4-wire thermistor and thermocouple.

   RTD's R0 value defaults to 100 ohms, which can be selected and entered into the menu and then manually modified.

   The operation step of thermocouple: press the [Probe Setting] to enter the Menu, press the [Probe] to choose [Thermocouple], press the [Item] to select the thermocouple type, press the [Reference] to select the appropriate temperature reference ----- internal temperature NTC sensor for temperature reference by default, and use the arrow keys to set the offset value under the [Offset Adjustment] Menu.

4. Set the relative value

   Turn on or off the relative operation function. When the relative operation is turned on, the displayed number is the actual measured value minus the set relative value. (For details on how to set the relative value, refer to the section "Mathematical Operation Function" in this chapter).

5. Set the unit

   The temperature unit can set to ℃, ℉, and K.

6. Read the measured value

   Set the probe to under test position and read the displayed value.

7. Mathematical operation

   The user can perform mathematical operations (statistic, limit, relative) on measurement readings. For details on how to use this function, refer to the section *Mathematical Operation Function* in this chapter.

8. Graphical display

   The user can change the display mode of the measured data via [Display]. There are four display modes: Digital, Bar, Tendency, and Histogram. For details, please refer to the *Display Mode* section.

Notes

When selecting thermocouple temperature measurement mode, if the input is suspended, random readings will appear.

Auxiliary System Function

In the auxiliary system menu, the user can set the system parameters of the multimeter.

Press the Shift key, and then press the Display key to enter the operation menu of the auxiliary system function, as illustrated below.

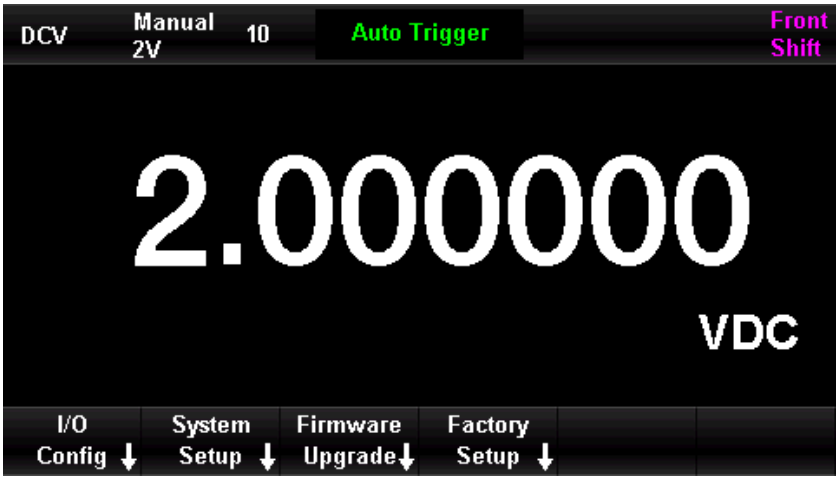


Figure 2-35 Auxiliary System Function Menu

Table 2-13 Auxiliary System Function

Menu	Description
Interface configuration	Set the instrument's interface parameter, which is Ethernet setting, serial port setting
System Setting	Language, beeper, display setting, time and date, About
Firmware	The instrument can be updated by reading inserted USB
Factory Setting	Reset the instrument to the factory settings

Storage and Restore

UT8806E multimeter supports storing and restoring settings for instrument parameter files and data files in the local storage and external USB storage devices.

Press the Shift key and then press Math key to enter the storage and restore menu, as illustrated below.

Figure 2-36 Storage and Restore Menu

Table 2-14 Storage and Restore Function

Function Menu	Description
Location	Select local storage or external storage
Item	SYS CFG: save the current parameter or restore an existing parameter MEAS CSV: save the measurement data SHOT BMP: screen capture the current interface and save
Read	Read stored file data
Save	Save the instrument's data
Delete	Delete the selected file
More	Formatting the storage Copy the current file to storage Copy all files to external storage

Data Storage

The user can store the configuration file (corresponding to SYS CFGItem), data file (corresponding to MEAS CSVItem) or image file (corresponding to SHOT BMPItem) in the internal storage or external USB storage device.

After entering the storage and restore menu, first press the [Location] to select the storage area, then press the [Item] to select the stored data, then press the [Save], and finally enter the file name to complete the storage operation, as illustrated below.

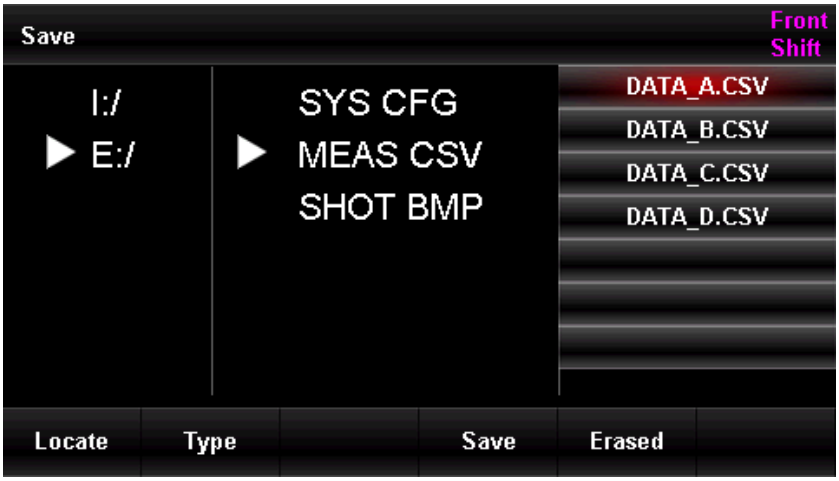


Figure 2-37 Storage Menu

Read Data

The multimeter can be configured by reading the status file stored in the local or external USB storage device.

After entering the storage and restore menu, first press the [Location] to select the storage area, then press the [Item] to select the stored data, then press the up and down keys to select the file to read, and then press the [Read] to read the selected data, as illustrated below.

Figure 2-38 Read Menu

Default Setting

After entering the storage and restore menu, press the [Default] to restore the current settings to the factory defaults.

Table 2-15 Default Setting

Item	Function	Default Setting
Basic Setting	Default measurement	DC voltage measurement
	Integral time	10 PLC
	Automatic zeroing	OFF
	Input impedance	Auto (greater than 10 GΩ)
	Relative value	OFF
	Filter	>20 Hz
	Current scale	200 mA
	Voltage scale	Auto
	Trigger mode	Auto trigger
	Trigger delay	Auto
	Probe hold	OFF
	Measuring interval	100 ms
Temp	Probe type	RTD 2W
	Unit	℃
Continuity Measurement	Beeper	OFF
	Threshold	30 Ω
Display	Display mode	Digital
	Prompt	OFF
	Dual display	OFF
	Digital mask	Auto
Port Setting	Ethernet	ON
	Serial port	Baud rate 9600, no parity bit, stop bit1
Mathematical Function	VMC output	OFF
	Statistic	OFF
	Limit value	OFF
	Calibration	OFF

File Management

UT8806E multimeter supports file management for both local and external storage. Users can perform functions such as saving screen files, deleting, copying, and formatting files.

Press the Shift key and then press the Math key to enter the management file menu, as illustrated below.

Figure 2-39 File Management Menu

- Screenshot

  In any interface that you want to make screenshot, press the [Shift] + [Math] key on the front panel to enter the management file menu, as shown in Figure 2-40. Press the [Location] key to select the location where you want to save; press the [Item] key to select the "SHOT BMP"; press the [Save] key, and finally edit the filename to complete the screen capture operation.

- Delete

  Press the [Shift] + [Math] key on the front panel to enter the management file menu, as shown in Figure 2-39. Press the [Location] key to select the location that the file stored; press the [Item] key to select the file; press the up and down keys to select the desired file and finally press the [Delete] key to complete the deletion.

- Copy

  UT8806E only supports copying the local files to external USB storage devices, pressing the [Shift] + [Math] key on the front panel to enter the management file menu, as shown inFigure 2-39. Select the internal storage device (I:/); press the [Item] key to select the file, and then press the up and down keys to select the desired file; press the [More] key and then press the [External] key to copy the file to external storage device or [Copy All] to copy all files to external storage device.

- Format

  UT8806E only supports formatting the local storage. Press the [Shift] + [Math] key on the front panel to enter the management file menu, as shown inFigure 2-39. Select the internal storage device (I:/); press the [More] key and then press the [Format] key to perform the formatting function.

I/O Configuration

Press the [Port Setting] key to enter the I/O configuration menu, as illustrated below.

Figure 2-40 I/O Setting Menu

LAN Setting

The user can operate the instrument remotely via the LAN interface. You can view and set the current IP address, subnet mask and gateway in the network settings.

After entering the operation menu of the auxiliary system, press the [Interface Configuration] key to open the network, select [Ethernet Setting] → [Network On] → [Network Setting] to

enter the interface as illustrated below, and change the current settings by using the arrow keys.

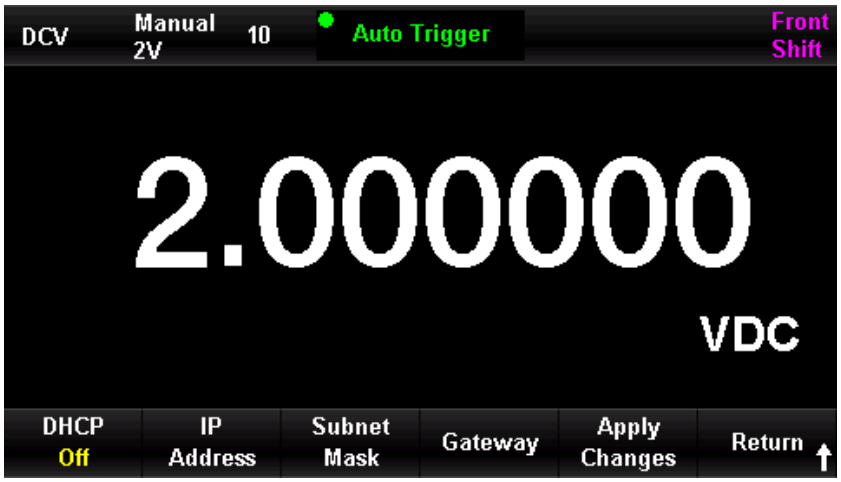


Figure 2-41 LAN Setting Menu

Table 2-16 LAN Parameter

Function Menu	Description
DHCP	Dynamic host computer, which can select on or off
IP address	Set the IP address
Subnet mask	Set the subnet mask
Gateway	Set the gateway
Apply changes	Save the change and return to the previous menu
Return	The unsaved part will not be saved, and return to the previous menu

RS-232C Setting

Configure the RS-232C serial port to ensure that the instrument's baud rate and parity settings match those of the connected computer. The serial port settings are stored in non-volatile memory.

Operation Step

After entering the operation menu of port setting, press the [Serial Port] to enter the RS-232C setting menu, as illustrated below.

Figure 2-42 RS-232C Setting Menu

The user can use the arrow keys to change the numeric value.

Table 2-17 RS-232C Parameter

Function Menu	Set Value	Description
Baud rate	2400, 4800, 9600, 19200, 38400, 56000, 57600, 115200, 128000, 256000	Set the baud rate for RS-232C operation
Parity bit	no parity check, odd parity check, even parity check	Set the parity bit for RS-232C operation
Stop bit	1 bit, 1.5-bit, 2-bit	Set the stop bit for RS-232C operation
Return		Save the change and return to the previous menu

Baud Rate

Set the baud rate for RS-232C operation, ensure that the baud rate of the instrument matches the baud rate of the computer being used. 2400, 4800, 9600, 19200, 38400, 56000, 57600, 115,200, 128,000, 256,000 are available for baud rate, and 9600 is the factory default setting.

The current selection is saved in non-volatile memory.

Parity Bit

Set the parity bits for RS-232 operation, ensure that the instrument settings matches the setting of the computer being used. The available parameters are “no parity check”, “odd parity check”, “even parity check”, and the factory default setting is “no parity check”.

The current selection is saved in non-volatile memory.

Stop Bit

Set the stop bit for RS-232 operation to adjust the data synchronization between the computer and the device. The available parameters are 1 bit, 1.5-bit, 2-bit, and the factory default setting is 1 bit.

The current selection is saved in non-volatile memory.

Notes

When the user uses RS-232 interface, if the parity bit of the multimeter is “no parity check”, it indicates the number of bits to be sent by the host computer should be 8 bits.

If the parity bit of the multimeter is “Odd parity/even parity check”, it indicates the number of bits to be sent from the host computer should be set to 7 bits.

System Setting

Press the Shift key and then press the Display key, select [System Setting] to enter the system setting menu, as illustrated below.

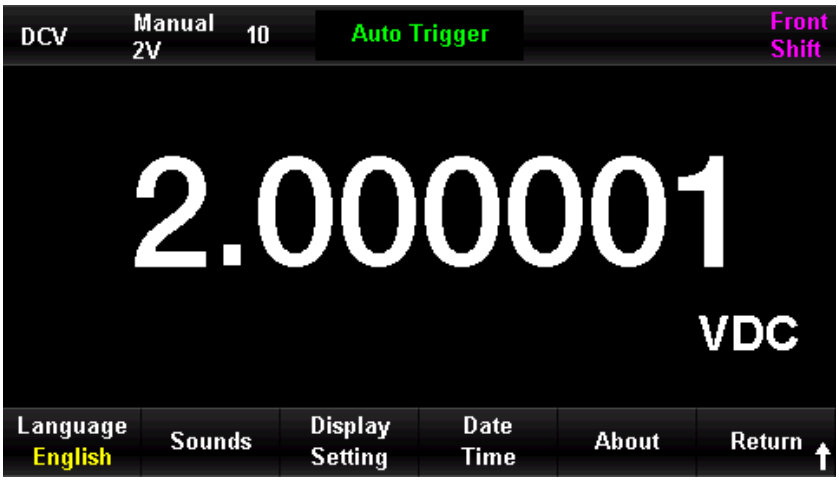


Figure 2-43 System Setting Menu

Table 2-18 System Setting

Function Menu	Description
Language	Set the language
Beeper	Turn on or off the beeper
Display setting	Adjust the backlight brightness to 10%, 30%, 50%, 70%, 90%, 100%; set the numeric format
Date and time	Set year, month, date, hour, minute
About	View the system version
Return	Return to the previous menu

1. Language

   The multimeter supports simplified-Chinese and English. All operation menus and help topics are displayed in the selected language.

2. Beeper

   Press the [Beeper] key to turn on/off this function. The instrument emits a 2 kHz beep when the beeper is turned on and the continuity measurement is enabled.

3. Display setting

   Adjust the drive current of the display backlight.

4. Time setting

   Press the [Time] key to enter the menu, and use the arrow keys to set year, month, day, hour and minute, and then press [OK] to save and exit the setting. The timing circuit is powered by the internal battery of the instrument.

5. About

   Check the system information, including the instrument's model, software version, hardware version and serial number, as illustrated below.

Figure 2-44 System Menu

Notice:

The device's initial web access password is a randomly generated factory default. This default password is displayed in the "About" section until modified by the user. After password modification, the field will display masked characters (--------) for security protection. Should you forget your customized password, you may restore the original factory default through a system reset procedure.

Firmware Update

UT8806E supports the firmware update via USB, it can update the current software to the newest version.

Operation Steps

1. Copy the update file package to a USB.
2. Insert the USB into the USB Host port on the front panel of the multimeter.
3. Press [Shift] → [Display] → [Firmware Update] → [OK] to start the upgrade.
4. After the upgrade is completed, the instrument will reboot, and the USB can only be removed at this time.
5. Restart the instrument and check the upgrade version.
6. Press the [Shift] and then [Display] key, and then select [System Setting] → [About] to check whether the upgraded hardware and software version numbers are consistent with the target version. If not, the upgrade is not successful, you need to follow the above steps to upgrade again.
7. After checking, press [OK] to exit the system menu.
8. Alternatively, the user can press the 

key and hold the key in the power on state, to update the software directly with the files in the USB.

Notes

1. There is only one upgrade file (UPG file) in the root of the USB.
2. During the update, please avoid these conditions, plug out USB, shunt down the instrument or power off.

Sampling Setting

Sampling is the process of taking signals at regular intervals and digitizing them. The trigger modes available for this multimeter include auto trigger, single trigger, and external trigger.

Press the Acquire key to enter the sampling setting menu, as illustrated below.

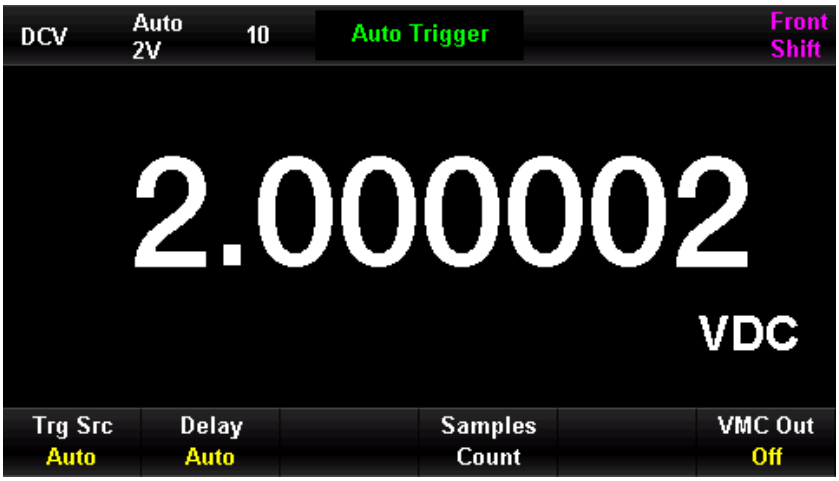


Figure 2-45 Sampling Setting Menu

Table 2-19 Sampling Function

Function Menu	Set Value	Description
Trigger Source	Auto trigger, single trigger, and external trigger	Set the trigger source for sampling
Delay	Auto/Manual	Set the delay
Sampling count		Set the sampling count for sampling
Slope	Positive/negative	Set the polarity for the external trigger slope
VMC Output	Positive/negative	Set the polarity of the pulse signal output to the external at the end of sampling

Automatic Trigger

The automatic trigger setting includes delay, sampling count/trigger and VMC output.

Operation Steps

1. Press the Acquire key, and select [Trigger Source] → [Auto], or directly press the Run/Stop key on the front panel to enable the automatic trigger function.

2. Set the delay
   The delay time indicates the waiting time before sampling starts after the trigger signal is issued. Press the [Delay] key to select auto or manual. When selecting the manual mode, use the left and right keys to switch the digit, and use the up and down keys to input the value.

3. Set the sampling count
   Press the [Sampling Count] key to set. Use the left and right keys to switch the digit, and use the up and down keys to input the value.

Sampling count

- Sampling count indicates the number of sampling points the multimeter collects when it receives a single trigger signal.
- The range of sampling count is 1 to 599,999,999.
- The default setting of sampling count is 1.

4. Set VMC output
   Press the [VMC Output] key to select the positive or negative polarity for the output pulse signal.

Single Trigger

The single trigger setting includes delay, sampling count/trigger and VMC output.

Operation Steps

1. Press the Acquire key, and select [Trigger Source] → [Single], or directly press the Single key on the front panel to enable the single trigger function, as illustrated below.

Figure 2-46 Single Trigger Menu

2. Set the delay
   Press the [Delay] key to select auto or manual.

3. Set the sampling count
   Press the [Sampling Count] key to set.

4. Set VMC output
   Press the [VMC Output] key to select the positive or negative polarity for the output pulse signal.

External Trigger

The external trigger signal is accessed through the EXT TRIG pin on the rear panel (see the rear panel of the instrument for details).
The external trigger setting includes delay, sampling count, slope and VMC output. The completed signal is output from the VMC terminal.

Operation Steps

1. Press the Acquire key, and select [Trigger Source] → [External] to enable the external trigger function.

Figure 2-47 External Trigger Menu

2. Set the slope
   Press the [Slope] key and select the polarity to positive or negative. The external trigger can be set to positive trigger or negative trigger.

3. Set the delay
   Press the [Delay] key to select auto or manual.

4. Set the sampling count
   Press the [Sampling Count] key to set.

5. Set VMC output
   Press the [VMC Output] key to select the positive or negative polarity for the output pulse signal.

Enable Trigger

UT8806E supports two trigger modes: automatic trigger and single trigger, it can be enabled by pressing the Run/Stop or Single keys on the front panel. The default mode is automatic trigger when the multimeter has powered on.

Automatic trigger

Press the Run/Stop key one time on the front panel to enable the automatic trigger, then it can acquire continuous reading. "Auto Trigger" will display at the black area on right top of the screen. Press it again to disable the trigger.

Single Trigger

Press the Single key on the front panel to generate a single trigger. "Single Trigger" will display at the black area on right top of the screen.

Help System

UT8806E multimeter provides a powerful help system, which can be called up at any time. The built-in help system provides help for any of the front panel keys and Menu soft keys. The user can also utilize the help list to get help information for some common operations.

Press the Shift key and press the Acquire key to enter the built-in help system, as illustrated below.

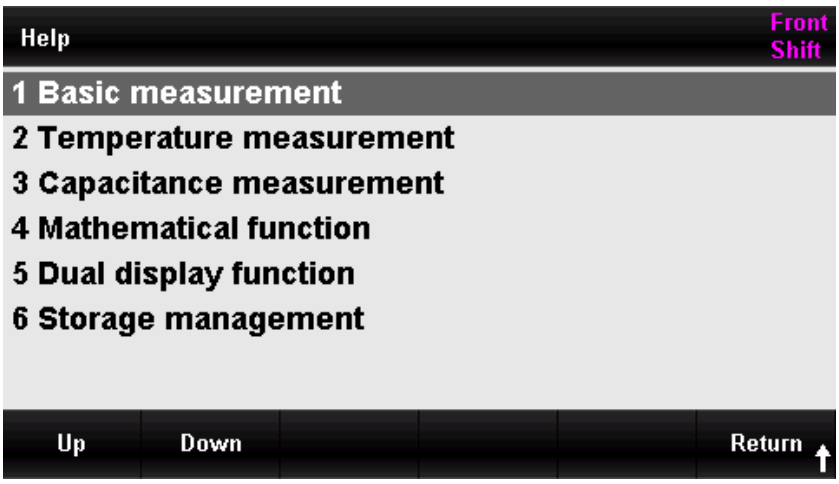


Figure 2-48 Help System Menu

Table 2-20 Help System

Function Menu	Description
Up	Move the cursor up to select the help menu
Down	Move the cursor down to select the help menu
Return	Return to the previous menu

1. Basic Measurement

   The way to obtain measurement type and measuring connection.

2. Temperature Measurement

   The way to obtain the temperature measurement.

3. Capacitance Measurement

   The way to obtain capacitance measurement.

4. Mathematical Operation

   Get help on how to use the Math function to perform mathematical measurements while measuring.

5. Dual Display

   This section describes how to use the dual display function during measurement measuring.

6. Storage Management

   The way to store and read data/parameters/arbitrary sensor files.

Operating Instructions

- In the help menu, the user can also use the up and down arrow keys to move the cursor to select the corresponding menu, and press the [Auto] key to read the help information.
- In the check help menu interface, the user can also use the up and down keys to move the cursor up or down to view the explanation information.

Special Notes

In addition to the above ways to get help information, the user can long press the option that to measure in the measurement interface, it can quickly enter the corresponding help interface. For example, if the user need help with DCV measurement, long press the [DCV] key to enter

the help interface of DCV; if the user need help with DCI measurement, press the [Shift] key and then long press the [DCI] key to enter the help interface of DCI.

Mathematical Operation

Mathematical operation consists of five main functions, statistics, limit value, dB, dBm, and relative operations. The Mathematical operation functions are available for voltage, current, resistance, capacitance, frequency/period, and temperature measurements, where dB and dBm operations are available for voltage measurements only.

Use the Math key to enter the mathematical operation menu, as illustrated below.

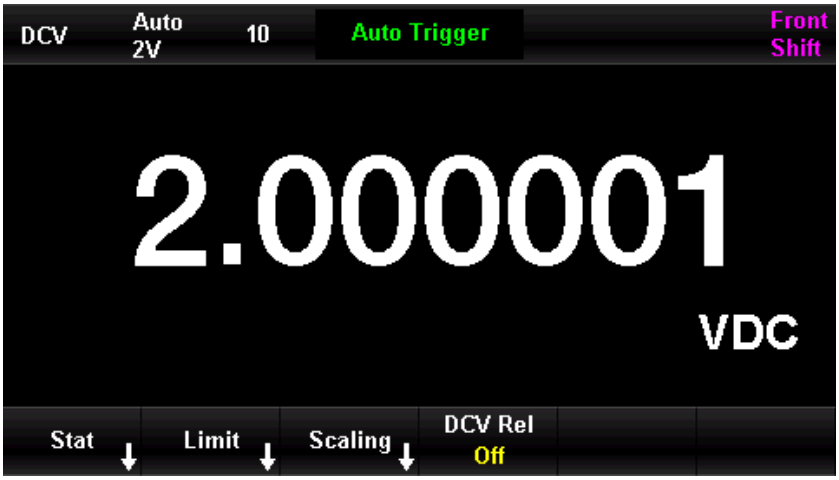


Figure 2-49 Mathematical Operation Menu

Table 2-21 Mathematical Operation

Function Menu	Set Value	Description
Statistics		Count the maximum, minimum, average, range, standard deviation, and sample size of the current measurement
Limit value		Execute Pass/Fail test according to the upper/lower limits
Calibration		Function: dB, dBm Set the reference resistance Set dB Rel Set the reference value for measurement
DCV Rel	ON/OFF	Open and set the relative operation or turn off the relative operation
dBm		Calculate the power transmitted to the measured reference resistor, 0 dBm = 1 mW.

Notes

- The mathematical operations can only be operated on the main display.
- If the measurement function is changed, mathematical operations are automatically switched off, except statistics.

Statistical Operation

The statistical operations are used to count the minimum, maximum, average, and variance of readings during a measurement. The statistical operation can perform on the measurement of DC voltage, AC voltage, DC current, AC current, resistance, frequency, period, capacitance, and temperature

Press Math →[Statistics] →[ON] to enter the statistical operation menu, as illustrated below.

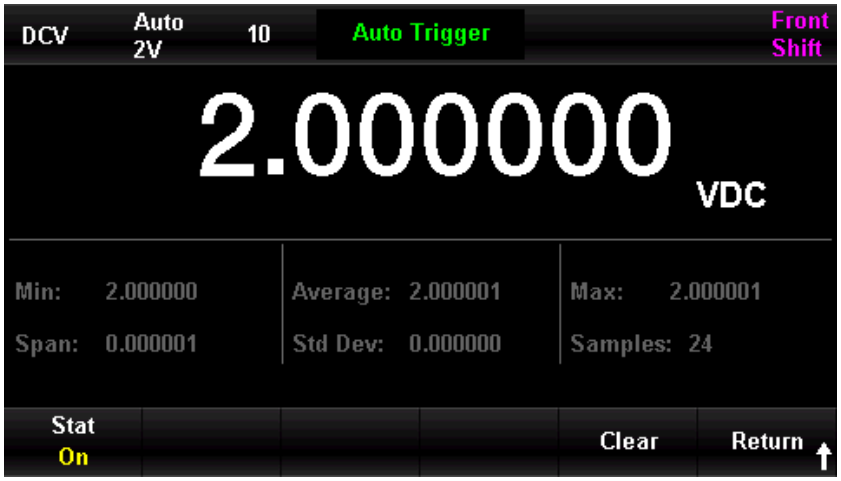


Figure 2-50 Statistical Operation Menu

Table 2-22 Statistical Operation

Function Menu	Set Value	Description
Statistics	ON/OFF	Turn on/off statistical operation menu
Min		Count the minimum of all readings during the measurement
Average		Count the average of all readings during the measurement
Max		Count the maximum of all readings during the measurement
Span		Count the range of reading during the measurement
Std dev		Count the standard deviation of all readings during the measurement

Samples		Count the current number of readings
Delete		Delete all current readings and restart counting
Return		Save all the changes and return to the previous menu

Methods for Statistical Operations

- When statistical operations are enabled, the first reading of the multimeter is displayed as the maximum or minimum value. When multiple readings are taken consecutively, the minimum value always displays the smallest of all current readings; the maximum value always displays the largest of all current readings.
- The counted maximum, minimum, average, and number of readings are stored in volatile memory and are automatically deleted when power is lost.

Limits Operation

The limit value operation can prompt for signals out of range according to the set upper and lower limit. The limits operation can perform on the measurement of DC voltage, AC voltage, DC current, AC current, resistance, frequency, period, capacitance and temperature measurement.

Press Math →[Limits] →[ON] to enter the limit value operation menu, as illustrated below.

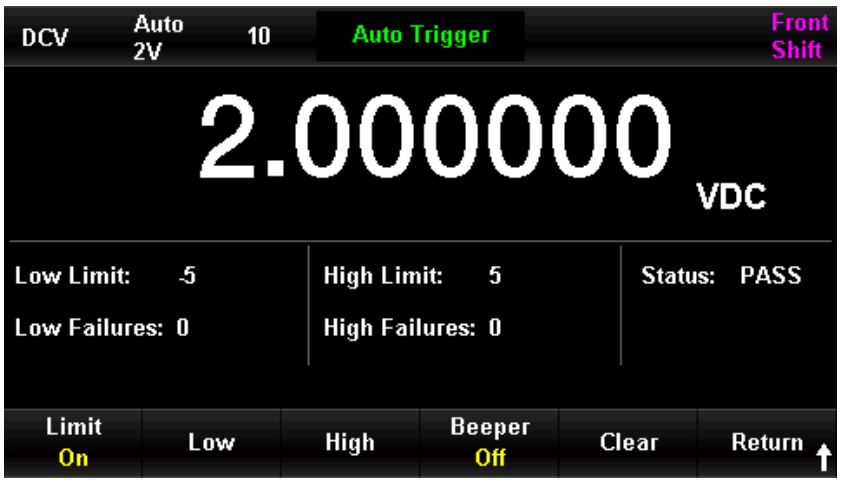


Figure 2-51 Limits Operation Menu

Table 2-23 Limits Operation

Function Menu	Setting	Description
Limit value	ON/OFF	Turn on/off the limits operation

Upper limit		Set the lower limit of the specified range
Lower limit		Set the upper limit of the specified range
Beeper	ON/OFF	When the beeper is enabled, it emits an audible alarm if the reading exceeds the preset limit
Delete		Delete the current state and restart counting
Return		Save all the changes and return to the previous menu
Low Limit		The lower limit of the current setting
High Limit		The upper limit of the current setting
Status		The state of limits operation (Pass/Fail)
Low Failures		The number of times the measured value falls below the lower limit
High Failures		The number of times the measured value exceeds the upper limit

1. Method for limit value

   Select the [Upper] or [Lower] and use the left and right arrow keys to edit the digit, and then use the up and down arrow keys to input the numeric value.

2. Unit of limit value

   The unit of limit value is set according to the current measurement.

3. Over range prompts

   - The main display font changes from black to red when the reading is greater than the set upper limit.
   - The main display font changes from black to red when the reading is smaller than the set upper limit.
   - The beeper emits an audible alarm when the reading exceeds the upper and lower limit values (if beeper is turned on).

The range of limits operations

- The specified upper limit should always be greater than the lower limit.
- The upper and lower limit values are stored in volatile memory. The upper and lower limit values are reset to their default values when the instrument is powered on.

Calibration

After the calibration function is enabled, select dBm operation or dB operation through the [Function] key.

dBm Operation

dBm is a decibel unit with respect to 1 mW, it represents the absolute value of the power value. dBm operations use the measured voltage result to calculate the power value of the reference resistor. dBm operations are only applicable to DC voltage and AC voltage measurements.

Press Math →[Calibration] →[ON] →[Function] →[dBm] to enter the dBm operation menu, as illustrated below.

Figure 2-52 dBm Operation Menu

Table 2-24 dBm Operation

Function Menu	Setting	Description
dBm	ON/OFF	Turn on/off dBm function
Relative resistance		Use the arrow keys to set the parameter to 1 Ω to 8000 Ω.
Return		Save all the changes, and return to the previous menu

Method for dBm operation

When dBm operation is performed, the voltage measurement value will convert to dBm according to the following equation.

$$dBm = 10 \times Log10\ [(Reading^{2} / R_{REF}) / 0.001W\ ]$$

Reading is voltage measurement value. R_{REF} is the reference resistor.

dB Operation

dB indicates a relative value, which is used to the relative operation for dBm. dB operations are only applicable to DC voltage and AC voltage measurements.

Press Math →[Calibration] →[ON] →[Function] →[dB] to enter the dB operation menu, as illustrated below.

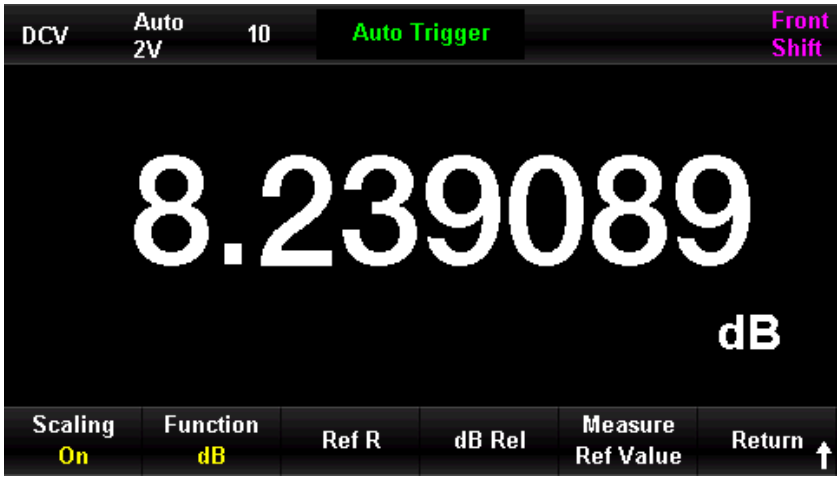


Figure 2-53 dB Operation Menu

Table 2-25 dB Operation

Function Menu	Setting	Description
dB	ON/OFF	Turn on/off dB function
Reference resistor		Use the arrow keys to set the parameter to 50 Ω to 8000 Ω
dB relative value		Set the relative value for dB
dB Rel		
Measure reference value		
Return		Save all the changes, and return to the previous menu

Method for dB operation

When dB operation is enabled, the instrument calculates the dBm value for the next reading and differs this dBm value from the stored dB setting as shown in the following equation.

$$dB = 10xLog10\ [(Reading^{2} / R_{REF}) / 0.001W\ ] - dB$$ relative value

The set range of dB is -200 dBm to +200 dBm. The default dB is 0 dBm.

dB relative value

- Enter a value on the operator interface (using the arrow keys) and store this value as dB relative value.
- dB relative value is stored in volatile memory. It will be deleted when the power is turned off.

Relative Operation

The relative operations are used for relative measurements. The actual measurement reading is equal to the difference between the measured value and the preset value.

Press Math →[XXX Rel] →[ON] to enter the relative operation menu, as illustrated below.

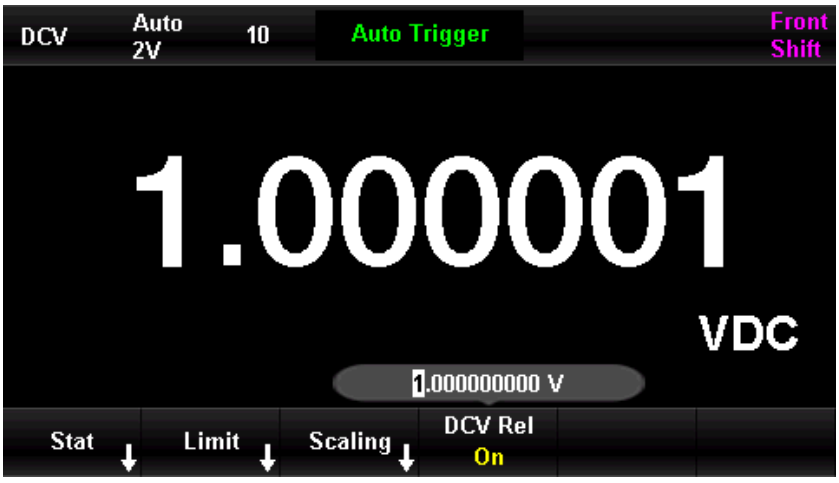


Figure 2-54 Relative Operation Menu (take DCV as an example)

Table 2-26 Relative Operation

Function Menu	Setting	Description
The switch of relative value	ON/OFF	Turn on/off the relative operation
relative value		Use the arrow key to set this parameter

Finish		Save all the changes, and return to the previous menu

Method for relative operation

When the relative operation is enabled, the screen displays the results of relative operation.

Primary = Measured Value – Preset Value

The relative operation can be performed on the measurement of DC voltage, AC voltage, DC current, AC current, resistance, frequency/period, capacitance and temperature.

Notes

There are two ways to turn on/off relative operation.

1) Press [Math] → [DCV Rel] → [On], this method can set the preset value by manual.
2) Press [Math] → [Relative] → [On], this method can set the current measured value to be the preset value.

Dual Display

The dual display function can display the primary measurement value and the secondary measurement value or the subsidiary value at the same time. When using the UT8806E, press the key 

to call up the dual display function. UT8806E supports the following dual display combinations.

Table 2-27 Combination of Dual Display

Primary Display	ACV	FREQ
	ACI	FREQ
	FREQ	Period, ACV
	Period	FREQ, ACV
	Temp (thermocouple)	Input voltage, reference temperature
	Temp (thermal resistance)	Resistance value

Notes

- The primary and secondary displays the updated measurement data separately.

- If the primary display utilizes a mathematical operation such as statistics, limits, relative, the primary display still displays the results of the mathematical operation when the secondary display is turned on.
- If the main display uses mathematical operation such as dB, dBm, the primary display will automatically quit the mathematical operation when the secondary display is turned on.
- The secondary uses the automatic range by default.
- The data display on the secondary cannot be saved.

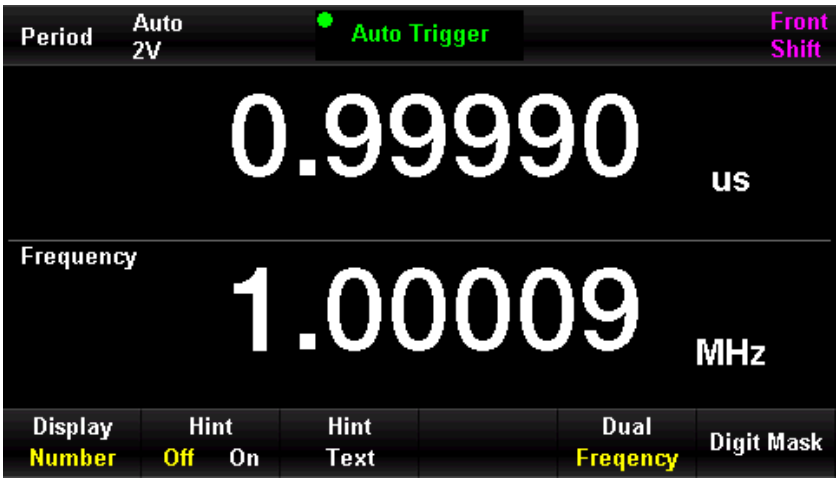


Figure 2-55 Dual Display

(take primary-frequency, secondary-period as an example)

Display Mode

The measured data can be viewed in four ways, digital, bar figure, tendency figure and histogram figure.

Digital

Operation Steps

Press the Display key to enable the display menu, as illustrated below. The default display mode is digital mode.

Figure 2-56 Digital Display Mode

Table 2-28 Display Mode

Function Menu	Setting	Description
Display		Select display mode
Prompt	ON/OFF	Turn on/off Prompt
Prompt Content		Set the prompt content

Bar Figure

Operation Steps

1. Press the [Bar] key to enter the bar figure display mode.

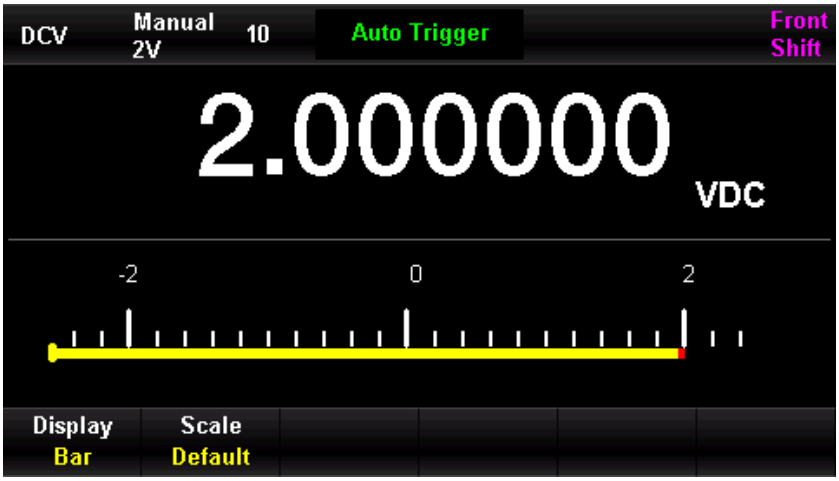


Figure 2-57 Bar Mode

2. Press the [Scale] to select the horizontal scale to default or manual (limits function is enabled).

Table 2-29 Manual Setting of Horizontal Scale in Bar Figure

Function Menu	Description
High level	Set the upper limit for the horizontal scale
Low level	Set the lower limit for the horizontal scale
Center value	Set the middle value for the horizontal scale
Range	Set the range for the horizontal scale

Tendency Figure

Operation Steps

1. Press the [Tendency] key to enter the tendency mode.

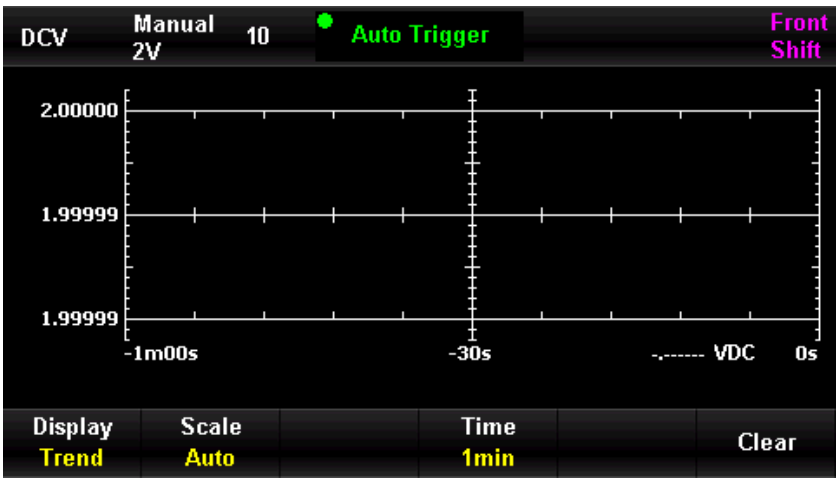


Figure 2-58 Automatic Display in Tendency Mode

2. Press the [Scale] to select the mode for horizontal scale. There are three modes: default, manual, and automatic.

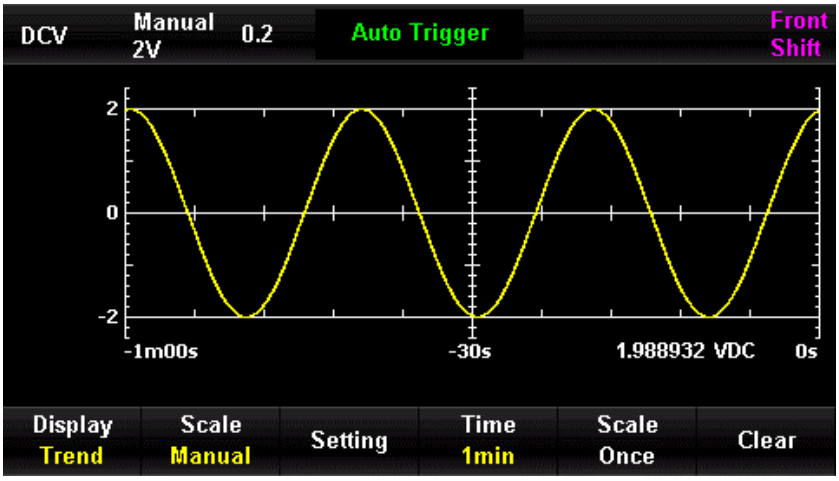


Figure 2-59 Manual Display in Tendency Mode

Table 2-30 Manual Setting of Horizontal Scale in Tendency Figure

Function Menu	Description
Setting	Set the high level, low level, middle value and the range for the horizontal scale
Time	1, 5, 10, 30, 60 minutes
Single scale	Automatically adjust to the appropriate scale value
Delete	Delete historical tendency data

Histogram Figure

The histogram figure displays the measured data in the form of frequency distribution.

Operation Steps

1. Press the [Histogram] key to enter the histogram mode.

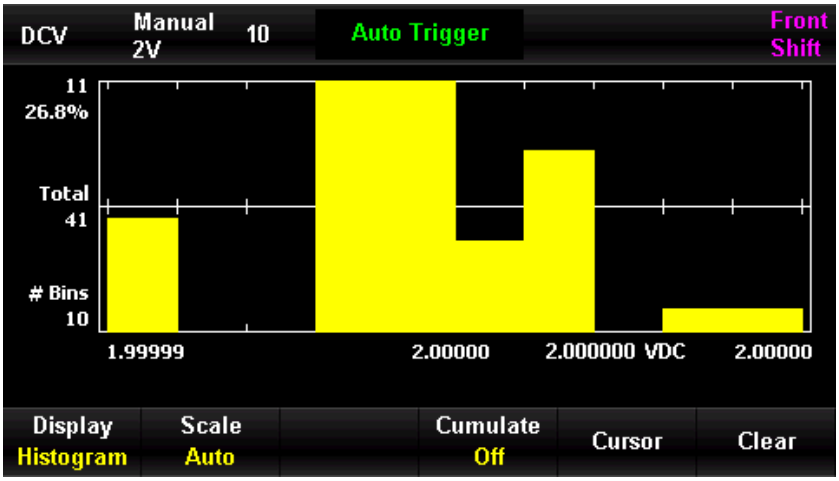


Figure 2-60 Histogram Mode

Table 2-31 Histogram Mode

Function Menu	Setting	Description
Histogram Figure		Set the display mode to histogram figure
Scale	Auto/Manual	Set the histogram number, horizontal scale for the histogram figure
Coordinate	ON/OFF	Turn on/off the coordinate display
Delete		Delete all the current readings and restart counting
Accumulation	ON/OFF	Display or hide the cumulative distribution function curve
Return		Save all the changes, and return to the previous menu

2. Press the [Scale] to select the manual mode and press the [Setting] key to enter manual setting in histogram figure, as illustrated below.

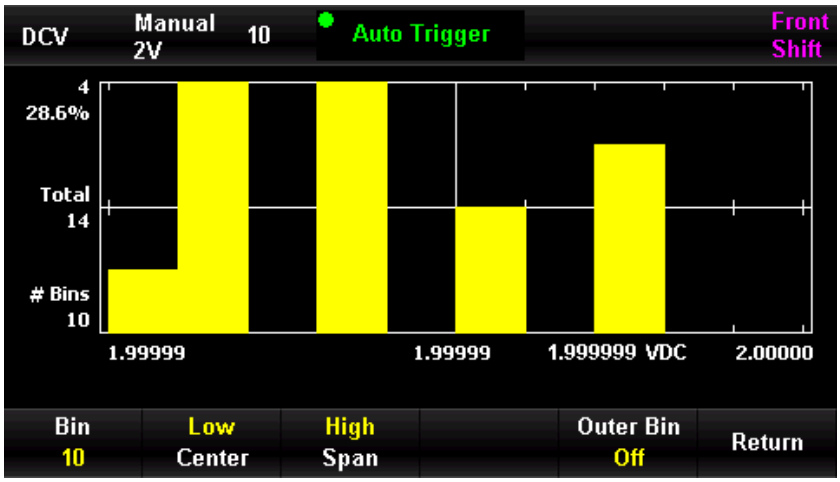


Figure 2-61 Manual Display in Histogram Figure

Table 2-32 Manual Setting in Histogram Figure

Function Menu	Setting	Description
Histogram number		Set the histogram number to 10, 20, 40, 100, 200, or 400
Low limit		Set the low limit for the horizontal scale
Middle value		Set the middle value for the horizontal scale

High limit		Set the high limit for the horizontal scale
Range		Set the range for the horizontal scale
External bar	ON/OFF	Display or hide the additional histograms, it indicates the reading out of the histogram range
Return		Save all the changes, and return to the previous menu

Hold Measurement

When the hold measurement function is turned on, the beeper sounds a beep (if the beeper is turned on) when the multimeter takes a continuous stable reading and records the measurement on the front panel display. The screen retains up to 8 readings of the latest measurement. The user can view the history of the measured data.

Press the Shift key and then press the Single key to turn on the Hold measurement menu. "● Probe Hold" displays at the black area on right above of the screen, as illustrated below.

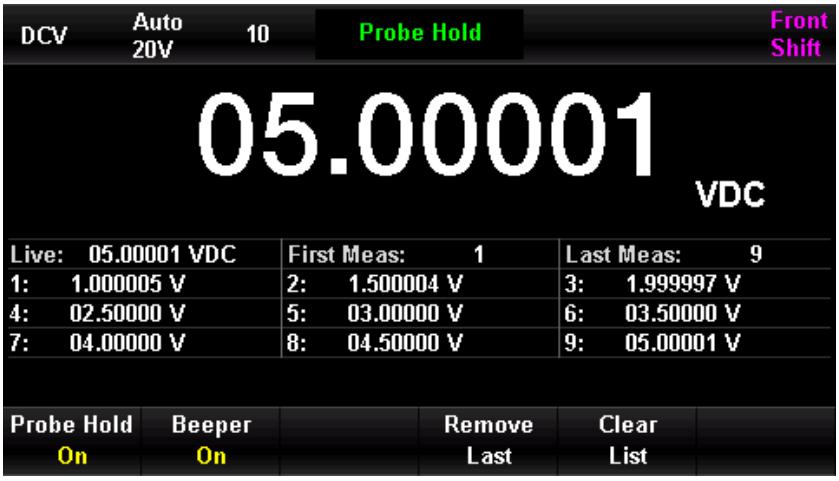


Figure 2-62 Hold Measurement Menu

Table 2-33 Hold Measurement

Function Menu	Setting	Description
Probe hold	ON/OFF	Turn on/off the probe hold function
Beeper	ON/OFF	Turn on/off the beeper function
Delete the last item		Delete the last reading

Delete List		Delete all the measured data in the list

Chapter 3 Measurement Guide

This chapter provides information on how to eliminate the possible errors in measurement to obtain accurate measured results.

- Load Error (DC-Voltage)
- True RMS AC Measurement
- Crest Factor Error (non-sine wave input)
- Load Error (AC-Voltage)
- Leakage Current Error
- Noise Rejection
- Resistance Measurement
- Other Measurements

Load Error (DC-Voltage)

The measurement load error occurs when the resistance of the device-under-test (DUT) accounts for a significant proportion of the input resistance of the multimeter itself. The following figure illustrates the source of this error.

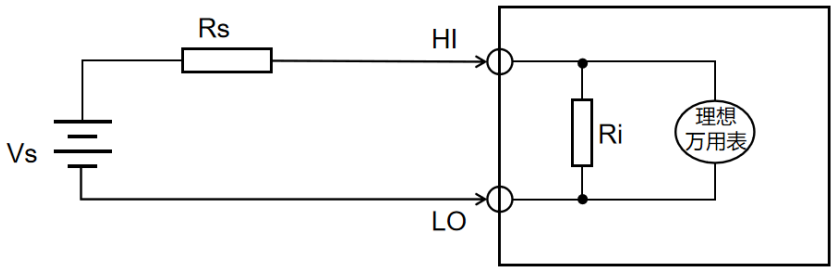


Figure 3-1 Load Error

Vs = ideal DUT voltage

Rs = resistance of DUT

Ri = input resistance of multimeter (10 MΩ or 10 GΩ)

$$\text{Error}(\%) = \frac{100 \times \text{Rs}}{\text{Rs} + \text{Ri}}$$

To minimize the load error effect and reduce noise interference, set the input resistance to "10 GΩ" for the 200 mV, 2 V, and 20 V scales, and fix the input resistance of 200 V and 1000 V to "10 MΩ".

True RMS AC Measurement

The AC measurement of the UT8806E has a true RMS response. The average heating power of a resistor over a period of time is proportional to the square of the RMS of the voltage applied to the resistor over that period of time, and is independent of the waveform. UT8806E can accurately measure the RMS value of a voltage or current waveform when it contains negligible energy outside the effective bandwidth of the multimeter.

The AC voltage and AC current functions of the multimeter can measure "AC Coupling" true RMS, that is, the RMS value of the AC component of the measurement signal (the DC component is filtered out). Since the sine, triangle and square waves do not contain a DC offset, their AC RMS and AC+DC RMS values are equal, as shown in Table 3-1.

Table 3-1 TRMS AC Measurement of Sine, Triangle and Square Waves

Waveform	Crest Factor (C.F.)	AC RMS	AC+DC RMS
Sine Wave	$\sqrt{2}$	$\frac{V}{\sqrt{2}}$	$\frac{V}{\sqrt{2}}$
Triangle Wave	$\sqrt{3}$	$\frac{V}{\sqrt{3}}$	$\frac{V}{\sqrt{3}}$
Square Wave	$\sqrt{\frac{T}{t}}$	$\frac{V}{C.F.} \times \sqrt{1-\left(\frac{1}{C.F.}\right)^2}$	$\frac{V}{C.F.}$

Asymmetrical waveforms, such as pulse trains, contain DC components that are filtered out by AC coupling TRMS measurement.

AC coupling TRMS measurement is very suitable or measuring small AC signals that contain DC offsets, e.g., measuring AC ripple in the output of a DC power supply. However, in some cases, it is necessary to measure the AC+DC RMS value. In this case, the user can use the DC Voltage and AC Voltage functions to measure the DC and AC components of the signal respectively, and then calculate its AC+DC RMS value according to the following formula. The DC voltage measurement needs to be made with 6.5-bit precision for optimal AC rejection.

$$\mathrm{RMS}_{(AC+DC)} = \sqrt{AC^2 + DC^2}$$

Crest Factor Error (non-sine wave input)

It is a common misconception that "Since the multimeter can measure the true effective value of the signal, its sine wave accuracy index can naturally be applied to other waveform input signals." In fact, the waveform of the input signal affects the accuracy of the measurement. The signal waveform is generally described by the Peak Factor, which is the ratio of the peak value of the waveform to its RMS value. In general, the larger the peak factor, the more energy is contained in the high-frequency harmonics. All multimeters have an error associated with crest factor. Notes that crest factor error does not apply to input signals below 100Hz.

The measurement error due to signal crest factor can be estimated as follows.

Total Error = Error (Sine) + Error (Crest Factor) + Error (Bandwidth)
Error (Sine wave): Sine wave error
Error (Crest factor): Peak factor plus error

Error (Bandwidth): The bandwidth error can be estimated according to the following formula.

Bandwidth error $= \frac{-C.F. \times F}{4\pi \times BW} \times 100\%$ (% reading)

C.F.: signal crest factor
F: pulse fundamental frequency
BW: effective bandwidth of multimeter

Example
Calculate the approximate measurement error for a pulse train input with a peak factor of 2 and a fundamental frequency of 20 kHz. Assume that the one-year accuracy of the multimeter is: ±(0.05% of reading + 0.03% of range).

Total Sum = (0.05% reading+ 0.03% range) + (0.05% range) + (0.8% reading)
= 0.85% reading+0.08% range

Load Error (AC-Voltage)

When using the AC voltage measurement function, the UT8806E's input impedance is a 1 MΩ resistor in parallel with a 100 pF capacitor. The multimeter test leads also introduce some capacitance and load. The approximate input resistance of the multimeter at various frequencies, as shown in Table 3-2.

Table 3-2 Resistance in Different Frequency

Input Frequency	Output Frequency
100 Hz	1 MΩ
1 kHz	850 kΩ
10 kHz	160 kΩ
100 kHz	16 kΩ

When use low-frequency measurement:

$$\text{Load error}(\%) = \frac{-\text{Rs}}{\text{Rs} + 1\text{M}\Omega} \times 100\%$$

When use high-frequency measurement additional error:

$$\text{Load error}(\%) = \left[\frac{1}{\sqrt{1 + (2\pi \times \text{F} \times Rs \times Cm)}} - 1 \right] \times 100\%$$

F: Input frequency

Rs: Signal internal resistance

Cm: Input capacitance (100 pF) plus the capacitance on test lead

Leakage Current Error

When open-circuited (with an input resistance >10 GΩ), the input capacitance of a digital multimeter (DMM) accumulates charge due to input bias current. Within an ambient temperature range of 0°C to 30°C, the DMM's measurement circuit exhibits an input bias current of approximately 30 pA. Beyond 30°C, this bias current doubles for every 8°C increase. Depending on the resistance of the device under test, this current may introduce a small voltage offset, which becomes particularly significant if the resistance exceeds 100 kΩ or if the DMM operates at temperatures above 30°C.

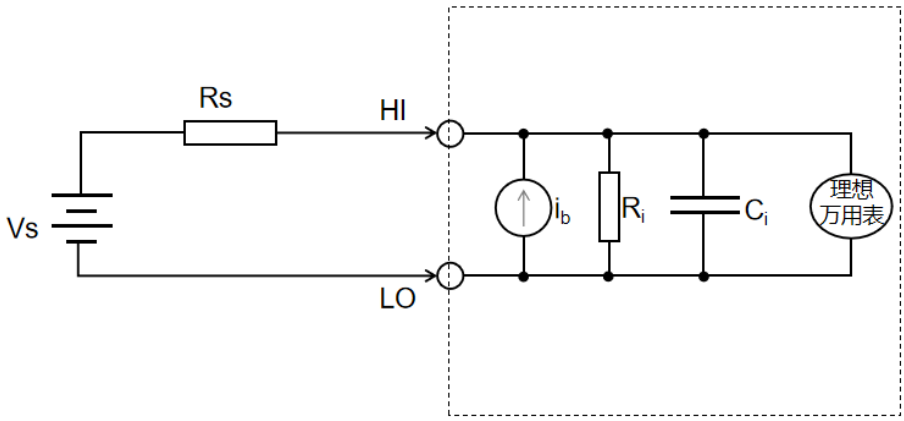


Figure 3-2

i_b = DMM's offset current

R_s = Resistance of DUT

C_i = DMM's input capacitance

For DC voltage: $C_i < 120\ pF$

For AC voltage: $C_i < 150\ pF$

Error (V) = $i_b \times R_s$

Noise Rejection

Rejecting Power Line Noise Voltage

One advantage of an integrating analog-to-digital (A/D) converter is its ability to reject power line-related noise present in DC input signals. This characteristic, known as normal mode noise rejection (NMR), allows a digital multimeter to minimize interference. A digital multimeter achieves NMR by integrating the average DC input over a fixed period. If the integration time is set to an integer multiple of the power line cycle (PLC), the noise components (and their harmonics) are effectively averaged out to near zero.

Common Mode Rejection (CMR)

Ideally, a multimeter circuit referenced to ground should be completely isolated. However, a small resistance exists between the multimeter's input LO terminal and ground. This resistance can introduce measurement errors, particularly when measuring low voltages that are floating relative to the ground terminal.

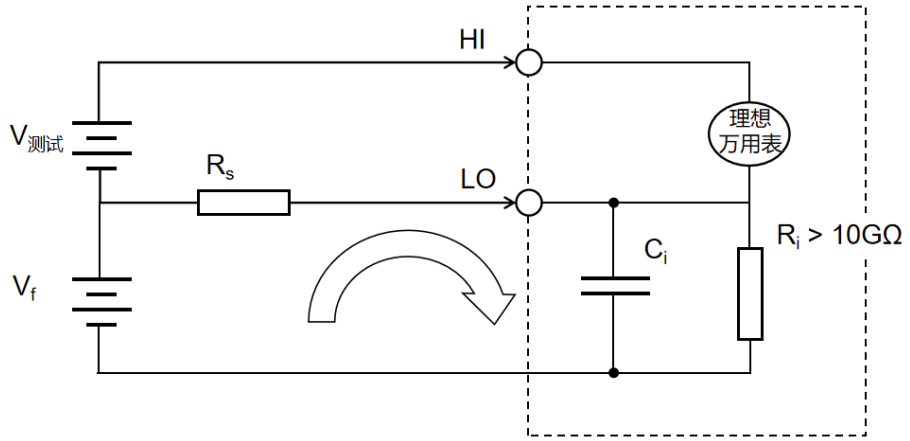


Figure 3-3

V_f = Floating voltage

R_s = Resistance offset of DUT

R_i = DMM's insulated resistance (LO-Ground)

C_i = DMM's input capacitance = 200 pF (LO-Ground)

$$\text{Error (V)} = \frac{V_f \times R_s}{R_s + R_i}$$

Noise Caused by Magnetic Circuits

When using this device, avoid operating near strong magnetic fields whenever possible. Additionally, do not conduct measurements near conductors carrying high currents, as this may induce unwanted voltages in the measurement connections. To minimize noise loop areas, use twisted-pair cables to connect the multimeter or keep all test leads bundled closely together

Noise Caused by Ground Loops

If both the multimeter and the device under test share a common ground, a ground loop may form due to voltage differences in the circuit. As illustrated below, any voltage difference (V_{ground}) between two grounding reference points can cause current to flow through the measurement leads. This introduces noise and unwanted offset voltages, often related to power line interference, which get superimposed onto the measured voltage.

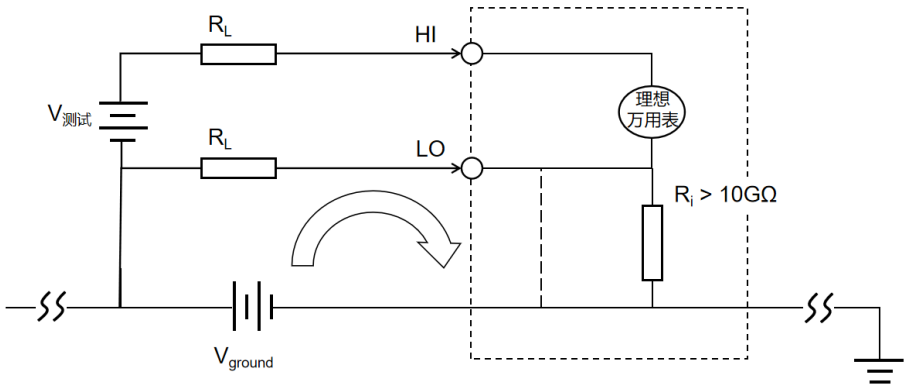


Figure 3-4

R_L = Conductor Resistance

R_i = DMM's insulated resistance

V_{ground} = Ground bus drop

The most effective way to eliminate ground loops is to keep the input terminals ungrounded and ensure galvanic isolation of the multimeter from ground. If grounding is necessary, both the multimeter and the device under test (DUT) should share a common ground point. When possible, also connect them to the same power outlet.

Resistance Measurement

This multimeter supports both 2-wire and 4-wire resistance measurements. In both methods, the test current flows from the high input terminal through the resistor under test.

2-wire Resistance Measurement

The voltage across the resistor is measured internally by the multimeter. As a result, the resistance of the test leads is included in the measurement, which may introduce errors.

4-wire Resistance Measurement

Separate pairs of leads are used for current supply and voltage measurement. Since no current flows through the leads measuring voltage, their resistance does not affect the measurement accuracy.

Note: The measurement error for DC voltage also applies to resistance measurements.

The 4-wire method provides the highest accuracy for measuring low resistances, as it effectively eliminates the impact of lead and contact resistance. This method is particularly useful when measuring circuits with significant impedance, long cables, multiple connections, or switches between the multimeter and the device under test.

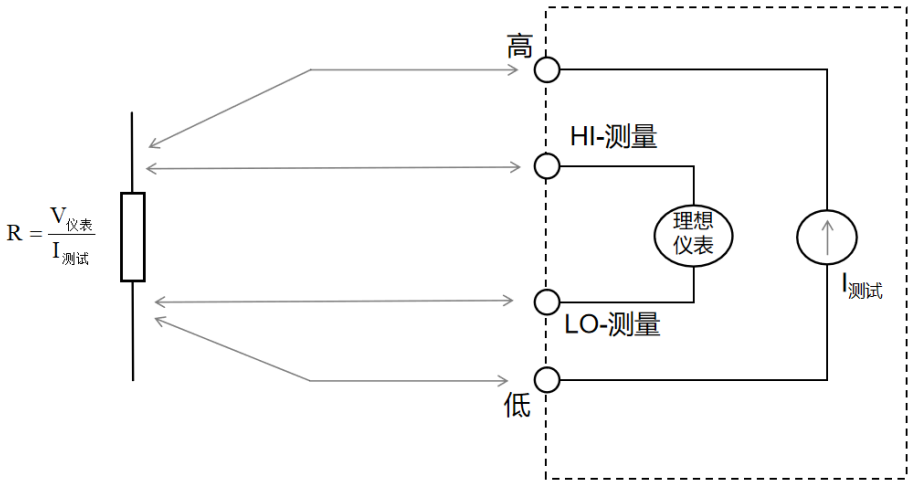


Figure 3-5

High-Resistance Measurement Errors

When measuring high resistances, significant errors can occur due to the insulation resistance of test equipment and surface contaminants on the resistor. To ensure accurate measurements, proper precautions must be taken.

Moisture absorption in insulating materials or surface contamination (such as dust or film buildup) can lead to inaccuracies. Compared to PTFE insulators, materials like nylon and polyvinyl chloride (PVC) have significantly lower insulation resistance. In humid environments, when measuring resistances above 1 MΩ, leakage currents from nylon or PVC insulators can introduce errors of up to 0.1%.

Other Measurements

Frequency and Period Measurement Errors

A multimeter measures frequency and period using reciprocal counting technology, which provides a fixed measurement resolution for any input frequency. The AC voltage measurement module conditions the input signal before measurement.

All frequency counters are prone to errors when measuring low-voltage, low-frequency signals. Internal and external noise pickup can significantly affect delayed signal measurements. Measurement errors are inversely proportional to frequency. Additionally, a DC voltage offset in the input signal can also introduce measurement errors in frequency (or period) measurements. To ensure accurate readings, allow the isolated input DC capacitor of the multimeter to fully stabilize before measuring frequency.

Temperature Measurement

Temperature measurement requires a temperature sensor probe. The multimeter supports both 2-wire and 4-wire RTDs.

2-wire and 4-wire thermistors: 5k44007 type; for detailed thermistor requirements, refer to the section below.

Probe Tip Selection

RTDs (Resistance Temperature Detectors) provide highly precise and linear resistance-to-temperature characteristics, covering a temperature range of approximately -200°C to 500°C. Due to their inherent linearity, RTD conversion is relatively straightforward. The multimeter supports IEC 751 standard RTDs with a sensitivity of 0.385%/°C.

Thermistors, made from semiconductor materials, offer approximately 10 times the sensitivity of RTDs. However, their usable temperature range is more limited, typically spanning from -80°C to 150°C. Unlike RTDs, thermistors exhibit a highly nonlinear resistance-to-temperature relationship, making their conversion process more complex. UT8806E series multimeters

use the standard Hart-Steinhart approximation method for precise conversion, achieving a typical resolution of 0.08°C.

Thermistor Requirements

UT8806E uses the Hart-Steinhart formula to convert the measured thermistor resistance into a temperature value.

$$1/T = A + B(Ln(R)) + C(Ln(R))^3$$

Where:

A, B, and C are constants provided by the thermistor manufacturer, divided from three temperature test points.

R= thermistor resistance in ohms (Ω)

T= temperature in Kelvin (°C)

Note: Use only the 5kQ44007 type thermistor. The constants for this thermistor type are: A=1.285e-3, B=2.362e-4, C=9.285e-8.

Using an incorrect thermistor type will introduce errors. For a measured temperature of 100°C, the error will exceed 20°C.

Automatic Zeroing

Enabling the automatic zeroing function enhances measurement accuracy by compensating for internal offsets. However, activating this feature may reduce the reading speed due to additional correction processes.

Chapter 4 Applications

This chapter provides detailed information on using the UT8806E to make electrical measurements.

- Example 1 Reading Statistics
- Example 2 Eliminate Test Lead Impedance Error
- Example 3 dBm Measurement
- Example 4 dB Measurement
- Example 5 Limits Measurement
- Example 6 Hold Measurement
- Example 7 Thermocouple Setting and Measurement

Example 1 Reading Statistics

This section describes how to realize reading statistics in measurement. The multimeter is constantly updating the statistic when multiple readings are measured consecutively.

Operation Steps

1. Press the DCV key on the front panel to turn on DC voltage measurement and select the appropriate voltage scale.
2. Connect one end of the test lead to the multimeter, the red test lead to the Input-HI terminal and the black test lead to the Input-LO terminal, as shown in Figure 2-11.
3. Set the parameter for statistics operation.

   Press Math → [Statistics] →[ON] to turn on the statistics operation to count the maximum and minimum value.
4. Connect the test leads into the circuit and start the measurement.

   As Figure 4-1 and Figure 4-2, the statistical values are constantly updated as the number of samples increases.

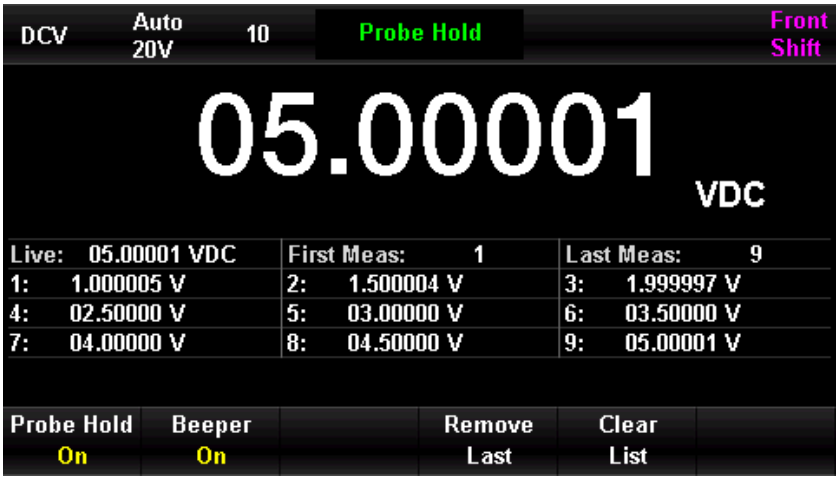


Figure 4-1 DCV Reading Statistics Menu 1

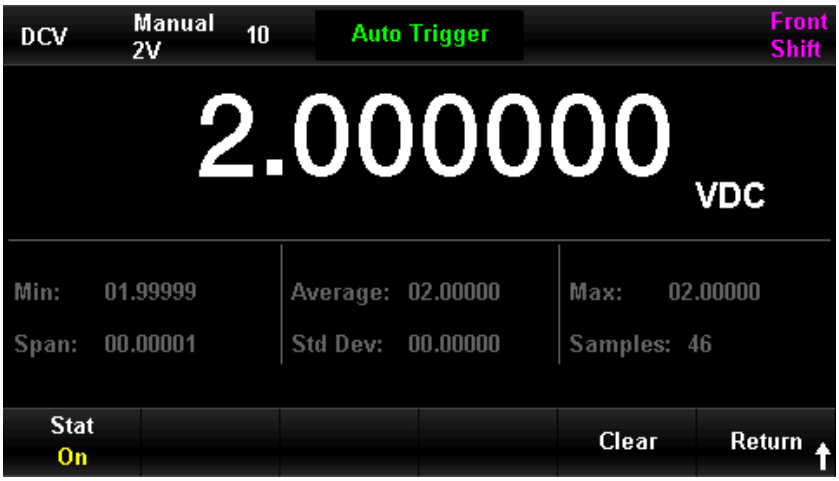


Figure 4-2 DCV Reading Statistics Menu 2

Example 2 Eliminate Test Lead Impedance Error

The impedance of the test leads causes a large deviation in the measurement when measuring resistors with small resistance values.

The error caused by the impedance of the test leads can be eliminated by the relative operation.

Operation Steps

1. Press the Ω2W key on the front panel to select 2-wire connection to measure the resistance.
2. Connect one end of the test lead to the multimeter, the red test lead to the Input-HI terminal and the black test lead to the Input-LO terminal, as shown in Figure 2-20.
3. Select the appropriate resistance according to the impedance range of the measured resistance. The automatic range is selected by default.

4. Short-circuit connect the two test leads and the screen displays the lead impedance, as illustrated below.

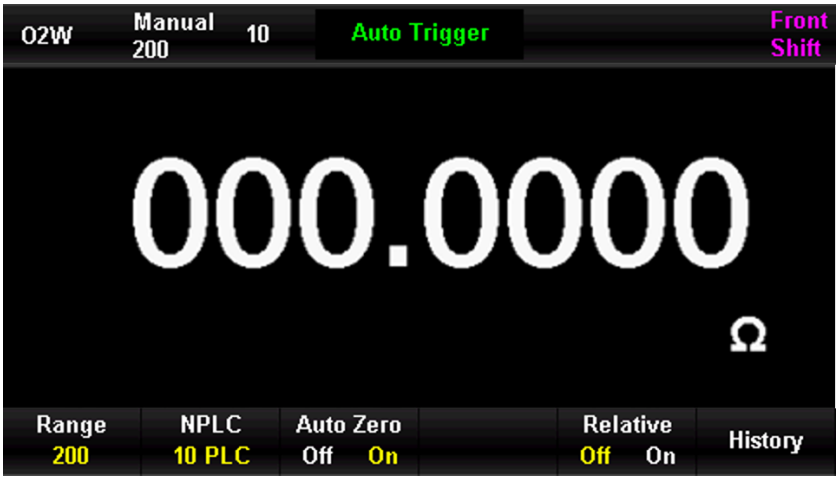


Figure 4-3 Reading of Test Wire Short-circuit

5. Set the parameter for relative operation.

   Press Math → [Relative Value] and use the arrow keys to set the parameter for the relative operation.

6. The user can directly open the relative operation on measurement interface and get the lead impedance after the relative operation.

Figure 4-4 Resistance Reading after Relative Operation

Example 3 dBm Measurement

The dBm operation is commonly used in audio signal measurement. The following describes how to realize dBm measurement.

Operation Steps

1. Press the ACV key on the front panel to turn on the AC voltage measurement and select the appropriate voltage scale.
2. Connect one end of the test lead to the multimeter, the red test lead to the Input-HI terminal and the black test lead to the Input-LO terminal, as shown in Figure 2-14.
3. Set the parameter for dBm operation.

Press Math → [Calibration] →[Function]→[dBm ON] to select the dBm function, and use the arrow keys to set the dBm operation to the reference resistance value in the hypothetical circuit, that is 50 Ω. In this case, the screen displays the reading is the power value of the reference resistor.

Figure 4-5 dBm Measurement Menu

Example 4 dB Measurement

The dB (decibel) is a common measurement unit and widely used in the fields of electrical engineering, radio, mechanics, shock vibration, mechanical power and acoustics. The following describes how to measure the power difference (dB value) between two circuits.

Method 1

Use Example 3 to measure the dBm1 and dBm2 of two circuits respectively.

$$dB = dBm1 - dBm2$$

Method 2

1. Press the ACV key on the front panel to turn on the AC voltage measurement and select the appropriate voltage scale.
2. Connect one end of the test lead to the multimeter, the red test lead to the Input-HI terminal and the black test lead to the Input-LO terminal, as shown in Figure 2-14.
3. Refer to dBm1 that measured by Example 3.

4. Press Math → [Calibration] →[Function]→[dB ON] to select the dB function, and use the arrow keys to set the dB relative value (dBm2). In this case, the screen displays the reading is the power difference between two circuits.

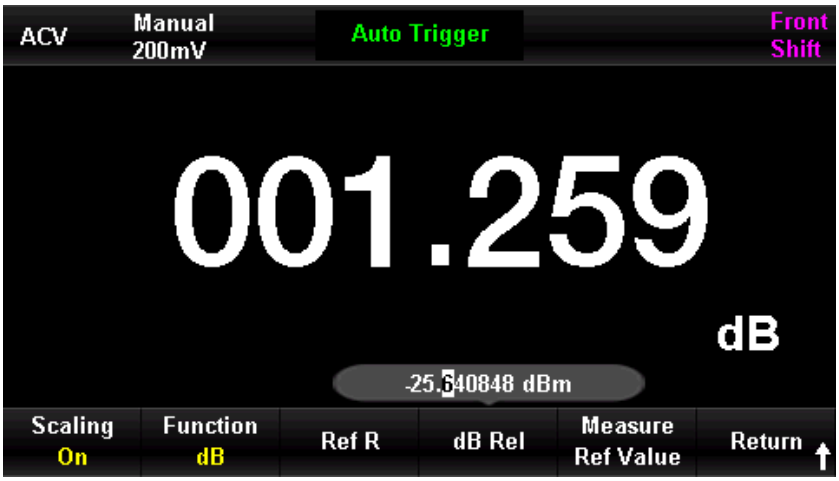


Figure 4-6 dB Measurement Menu

Method 3

1. Connect to circuit 1, refer to dBm2 that is measured by Example 3.
2. Press Math → [Calibration] →[Function]→[dB ON] to select the dB function, and select the relative value measurement. This operation is to set the current measurement value as the dB relative value, and the screen display the reading is 0.
3. Connect to circuit 2, the screen displays the reading is the power difference between two circuits.

Example 5 Limits Measurement

The limit operation prompts for out-of-range signals according to the set upper and lower limit parameters, while the beeper sounds an audible alarm (if beeper is turned on).

Operation Steps

1. Press the ACV key on the front panel to turn on the AC voltage measurement and select the appropriate voltage scale.
2. Connect one end of the test lead to the multimeter, the red test lead to the Input-HI terminal and the black test lead to the Input-LO terminal, as shown in Figure 2-14.
3. Press Math →[Limits] →[Limits ON] to set the upper and lower limits.

   Press the [Lower] to set the lower limit for the limits measurement.

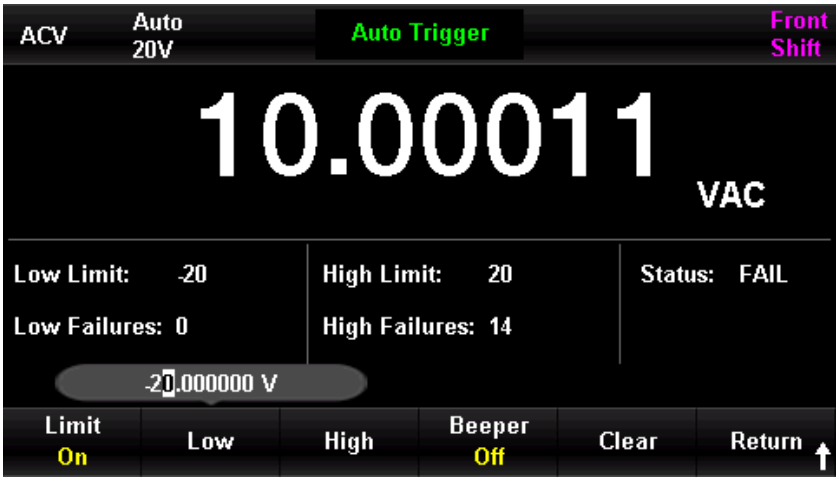


Figure 4-7 ACV Lower Limit Setting Menu

Press the [Upper] to set the upper limit for the limits measurement.

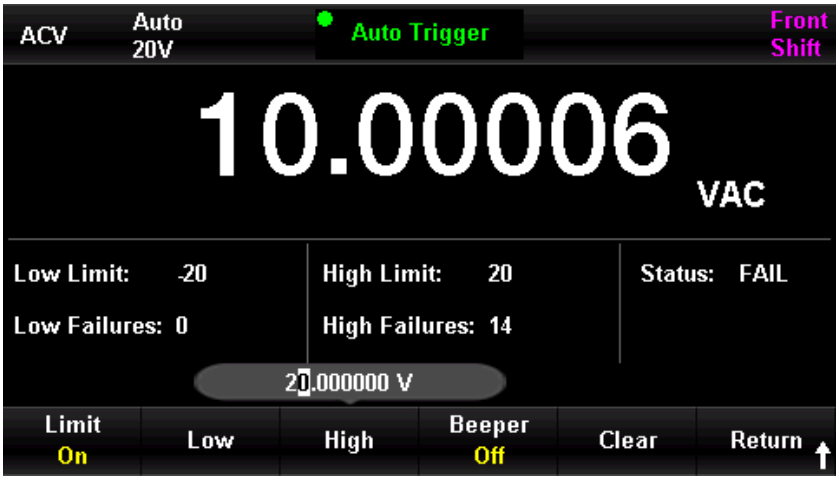


Figure 4-8 ACV Upper Limit Setting Menu

4. Turn on the limit test function and turn on the beeper, as shown in figure above. The measured value is between the set limits, so the limit test status is “Pass”.

5. If the measured value exceeds the specified range, the measured value is not within the set limit value, so the beeper sounds, the main display is red, the limit test status is “Failed”, and the number of upper limit failures is displayed, as shown in Figure 4-9.

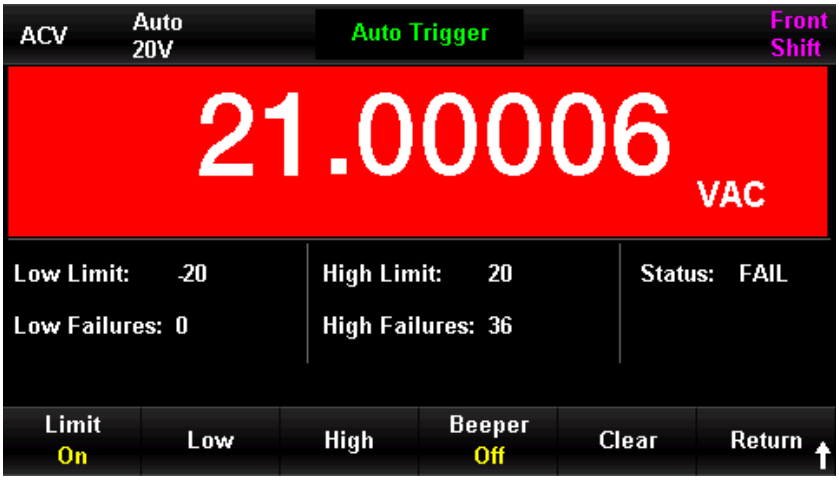


Figure 4-9 ACV Limits Measurement Menu

Example 6 Hold Measurement

The Hold measurement feature allows the user to obtain a steady reading that remains on the front panel display. The reading remains on the screen when the test pencil is removed. The following section describes how to hold the reading on the screen.

Operation Steps

1. Press the DCV key on the front panel to turn on the DC voltage measurement and select the appropriate voltage scale.
2. Connect one end of the test lead to the multimeter, the red test lead to the Input-HI terminal and the black test lead to the Input-LO terminal, as shown in Figure 2-12.
3. Press the Shift key and press the Single key to open the Hold measurement menu. At this case, the screen records the measured results of DC voltage, as illustrated below.

Figure 4-10 DCV Hold Measurement Menu

4. Press the ACV key on the front panel to turn on the AC voltage measurement and select the appropriate voltage scale.
5. Connect one end of the test lead to the multimeter, the red test lead to the Input-HI terminal and the black test lead to the Input-LO terminal, as shown in Figure 2-15. At this case, the screen records the measured results of AC voltage, as illustrated below.

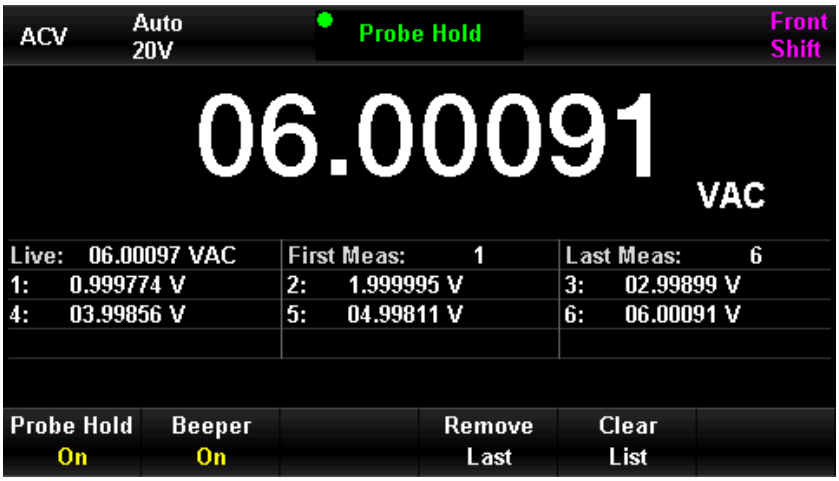


Figure 4-11 ACV Hold Measurement Menu

Example 7 Thermocouple Setting and Measurement

A thermocouple is a commonly used temperature sensor. When using thermocouple measurements, the thermocouple type, thermocouple voltage and cold end temperature should be confirmed.

UT8806E has a built-in temperature sensor for measuring the temperature near the HI terminal and LO terminal (cold end temperature). When thermocouple temperature measurement is performed, the multimeter automatically measures the cold end temperature and calculates the absolute temperature of the hot end according to the cold end temperature.

To set up the thermocouple temperature sensor, simply enter the correspondence between the thermocouple voltage and the temperature difference between the hot and cold ends based on the thermocouple type.

Operation Steps

1. Refer to the chapter 2 "Temperature Measurement" connect sensor, as shown in Figure 2-34.
2. Select the type of thermocouple sensor.

   Press the Shift key and then press the temperature key to enter the temperature measurement menu. Press [Probe Setting] → [Probe] → [Thermocouple], select the K-type thermocouple, as illustrated below.

Figure 4-12 K-type Thermocouple Temperature Measurement Menu

3. Return to the previous menu, Press [Probe] → [℃] to set the unit to ℃, then the measured value can be viewed.

4. Press the Display key, [Dual Display] → [Reference Temperature] or [Sensor], it can display the measured temperature and temperature of reference sensor.

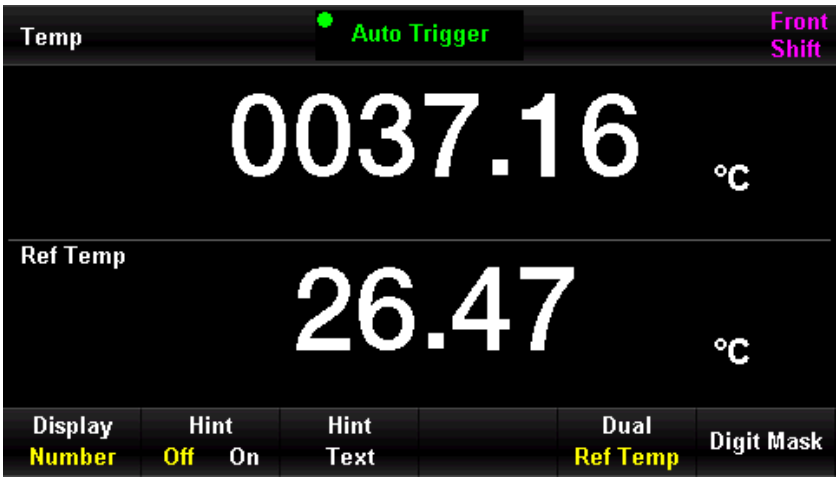


Figure 4-13 Dual Display of Temperature Measurement Menu 1

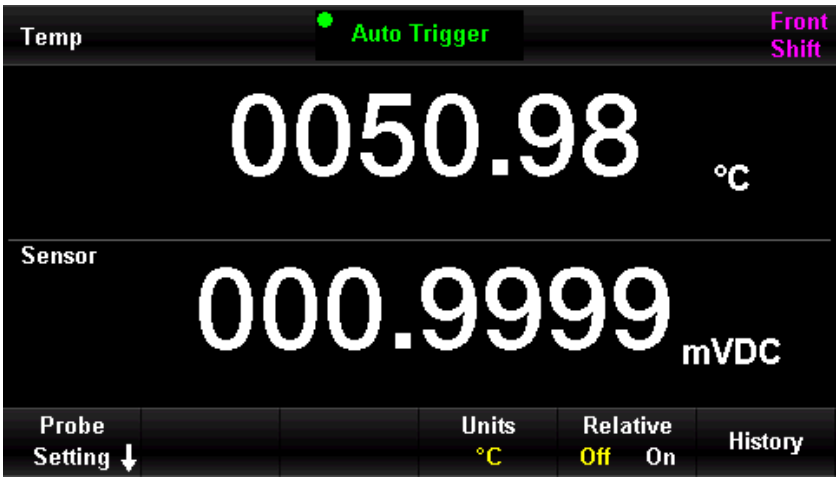


Figure 4-14 Dual Display of Temperature Measurement Menu 2

Chapter 5 Troubleshooting

1. If the multimeter remains black without any display when the power switch is pressed.
   (1) Check if the power plug is properly connected.
   (2) Check if the power switch on the rear panel is turned on.
   (3) Check if the fuse of the power input on the rear panel is fusing. If it is fusing, replace the fuse as required.
   (4) After making the above checks, restart the instrument.
   (5) If the product still does not work properly, contact the UNI-T Service Center for assistance.

2. When connecting a current signal, there is no change in reading.
   (1) Check if the probe is properly inserted into the current jack and LO jack.
   (2) Check if the current fuse on the rear panel probe is fusing.
   (3) Check if the measurement scale is correctly switched to DCI or ACI.
   (4) Check if the input is ACI but the scale is in DCI.

3. When a DC power signal is connected, the reading display is not normal.
   (1) Check if the probe is correctly inserted into the current jack and LO jack.
   (2) Check if the current fuse on the rear panel probe is fusing.
   (3) Check if the measurement scale is correctly switched to DCI or DCV.
   (4) Check if the input is DCI but the scale is in ACI.

4. USB cannot be recognized.
   (1) Check if the USB can work normally.
   (2) Ensure that the USB device is a flash drive. This instrument does not support hard disk-type USB storage.
   (3) Make sure the capacity of the USB is too large, the multimeter recommends using a USB not more than 128GB.
   (4) After restarting the instrument, insert the USB again for checking.
   (5) If the USB still does not work properly, contact the UNI-T Service Center for assistance.

Chapter 6 Appendix

Appendix A UT8806E Accessories

Standard Accessories

- 1 national power cord
- 1 pair of probes
- 1 USB cable
- 1 DB9 dual female straight-through serial port cable
- 1 copy of the Quick Guide
- 1 backup fuse

Notes

- The USB data cable and network cable connected to this product should be less than 3m in length, otherwise the product performance may be affected.
- All accessories should be ordered from your local UNI-T office.

Appendix B Maintenance and Cleaning

(1) General Maintenance

Keep the instrument away from the direct sunlight.

Caution

Keep sprays, liquids and solvents away from the instrument or probe to avoid damaging the instrument or probe.

(2) Cleaning

Check the instrument frequently according to the operating condition. Follow these steps to clean the external surface of the instrument:

a) Please use a soft cloth to wipe the dust outside the instrument.

b) When cleaning the LCD screen, please pay attention and protect the transparent LCD screen.

c) When cleaning the dust screen, use a screwdriver to remove the screws of the dust cover and then remove the dust screen. After cleaning, install the dust screen in sequence.

d) Please disconnect the power supply, then wipe the instrument with a damp but not dripping soft cloth. Do not use any abrasive chemical cleaning agent on the instrument or probes.

Warnings

Please confirm that the instrument is completely dry before use, to avoid electrical shorts or even personal injury caused by moisture.

Limited Warranty and Liability

UNI-T guarantees that the Instrument product is free from any defect in material and workmanship within three years from the purchase date. This warranty does not apply to damages caused by accident, negligence, misuse, modification, contamination, or improper handling. If you need a warranty service within the warranty period, please contact your seller directly. UNI-T will not be responsible for any special, indirect, incidental, or subsequent damage or loss caused by using this device. For the probes and accessories, the warranty period is one year. Visit instrument.uni-trend.com for full warranty information.

Learn more at: www.uni-trend.com

Register your product to confirm your ownership. You will also get product notifications, update alerts, exclusive offers and all the latest information you need to know.

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