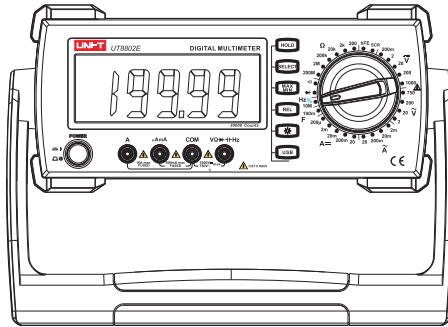


UNI-T®

UT8802E Benchtop Digital Multimeter User Manual



⚠ Warning: When the measured voltage is greater than 600V, The instrument cannot be used for measurements in CAT II, CAT III and CAT IV environment

I. Overview

UT8802E is a manual range, benchtop digital multimeter that features 19999 display counts, large LCD screen with backlight, full scale overload protection and a unique design. This instrument can be used to measure AC and DC voltage, AC and DC current, resistance, frequency, capacitance, transistor, hFE, diode (LED), SCR, continuity, etc.

This manual contains relevant safety and warning information. Please read the contents carefully and strictly follow all warnings and cautions.

II. Inspection of open box

Open the packing box and take out the instrument. Please check if the following items are deficient or damaged. Please contact your supplier immediately if any item is deficient or damaged.

| | |
|-------------------------------|-------|
| User Manual (CD-ROM)----- | 1 pc |
| Test leads ----- | 1 set |
| Alligator clip ----- | 1 set |
| Power cable (AC 220 V)----- | 1 pc |
| Software application CD ----- | 1 pc |
| USB interface wire ----- | 1 pc |

III. Safety rules

This instrument strictly follows the EN 61010-1: 2010, EN 61326: 2013, RoHS, pollution grade II safety standard, CAT II 600V.

⚠ Unplug the power cord when the instrument is not in use.

⚠ Note: In the case that the instrument is not used in accordance with the operation instructions, the protection provided by the instrument may be weakened or lost.

CLEANING

Be sure meter is turned off and wipe with a clean ,dry lint-free cloth.

Do not use abrasive cleaners or solvents

Power cord specification:

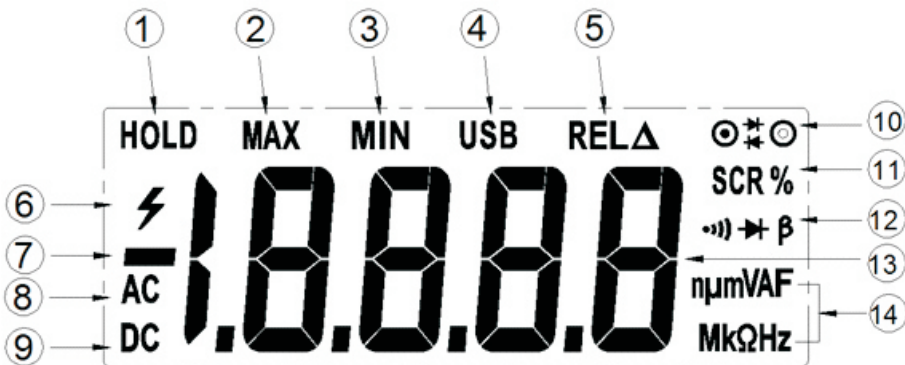
| Name | Description | Rating | Approval NO. |
|-----------|------------------------------|----------|--------------|
| CORD | H05VVf 3X0.75mm ² | 300/500V | 116006 |
| PLUG | XR-T002 | 16A 250~ | 40036455 |
| CONNECTOR | XR-W002 | 10A 250~ | 40040244 |

- Before using the instrument, please check if there is any item which is damaged or behaving abnormally. If any abnormal item is found (such as: test lead bared, housing case damaged, LCD broken, etc.), please stop using the instrument. It is strictly prohibited to use an instrument without shell cover. Otherwise, there is a danger of electric shock.
- If the test lead has been damaged, it must be replaced with the one of the same type or the same electrical specification.
- When measuring, do not touch exposed wires, connectors, unused inputs, or the circuits being measured.
- When measuring the voltage higher than 60 V dc or 36 Vrms, remember not to exceed the finger baffle plate position on the test lead in order to prevent electric shock.
Before each use, verify operation by testing a known working circuit that is within the rating of this unit.
- If the range of the voltage to be measured is unknown, the maximum range should be selected and then gradually decreased.
- Never input voltage and current which exceeds the rated range indicated on the instrument housing.
- Before switching the function knob to select the test range, make sure to disconnect the test probes with the circuit to be tested. It is strictly prohibited to turn the function knob during the measurement in order to avoid damages to the instrument.
- Do not use or store the instrument in high temperature, high humidity, flammable, explosive and strong magnetic field environments.
- Do not change the internal circuit of the instrument in order to avoid the damage to the instrument and user.
- After the measurements are finished, the power supply should be turned off. If the instrument is not used for a long time, please unplug the power cord.

IV. Comprehensive index

1. The maximum voltage between input and COM terminal is DC 1000V or AC 750V
2. μ A, mA input terminal protection: (CE) 400mA, 1000V fuse, Φ 6.3x32mm
3. 10A input terminal protection: (CE) F1 (12A, H, 1000V) fast melt fuse Φ 6.3x32mm
4. 19999 display counts, update rate 2 ~3 times per second.
5. Manual range
6. Polarity display: Auto
7. Over range symbol : OL
8. Operating temperature: 0~ 40°C (32°F~104°F)
9. Storage temperature: -10~ 50°C (14°F~122°F)
10. Relative humidity: 0°C~30°C \leq 75%RH, 30°C~40°C \leq 50%RH
11. Electromagnetic compatibility:
In the field with less than 1 V/m radio frequency, the total accuracy = designated accuracy + range of 5%,
In the field with more than 1 V/m radio frequency, the accuracy is not specified.
12. Power Supply: AC 100V/120V/127V/220V/230VAC/240V, 450-440Hz, 28VA max
Protection fuse being used: For AC 100V/120V/127V, AC 250V T 250mA
For AC 220V/230V/240V, AC 250V T 125mA
 μ A mA FUSE: 400mA/1000V
13. Outer dimension: (320 x 265 x 110) mm
14. Weight: about 3100g (accessories excluded)
15. Safety standards: IEC 61010: CAT II 600V
16. CAT II: It is applicable to test and measuring circuits connected directly to utilization points (socket outlets and similar points) of the low-voltage MAINS installation.
17. Temperature coefficient: 0.1 X (specified accuracy) /°C (< 18°C or > 28°C)








V. Symbols on LCD screen



- | | |
|------------------------------------|--|
| 1. HOLD : Hold mode | 9. DC : DC voltage test |
| 2. MAX : Max value test | 10. ⊕ ⊗ Diode and SCR Polar |
| 3. MIN : Min value test | 11. SCR % : SCR/duty cycle test |
| 4. USB : USB communication | 12. ∞ Continuity test |
| 5. RELΔ Relative value test | ➔ Diode test |
| 6. ⚡ High voltage test | β Transistor hFE test |
| 7. - Negative voltage | 13. Digital reading |
| 8. AC : AC voltage test | 14. Measurement unit |

VI. Function buttons & terminals introduction

1. Terminals :

| Range | Input terminal | Function |
|---|--------------------------------------|-------------------------------|
|  | V ↔ COM | DC voltage test |
|  | V ↔ COM | AC voltage test |
|  | V ↔ COM | Resistance test |
|  | V ↔ COM | Continuity test |
| Hz % | V ↔ COM | Frequency, Duty cycle test |
| F | V ↔ COM | Capacitance test |
|  | μA mA ↔ COM A ↔ COM | DC current test |
|  | μA mA ↔ COM A ↔ COM | AC current test |
|  | V ↔ COM socket adapter (UT-S03 A) | Diode (LED) test |
| hFE | socket adapter (UT-S03 A) | Transistor amplification test |
| SCR | socket adapter (UT-S03 A) | SCR test |

Function buttons:

1. Power On/Off button
2. LCD display screen
3. 20 A current input socket
4. μA and mA current input socket
5. COM terminal
6. Input terminal for V, Ω , Diode, Cap, Frequency
7. Function buttons

HOLD: Data holding button

SELECT : Function selection button

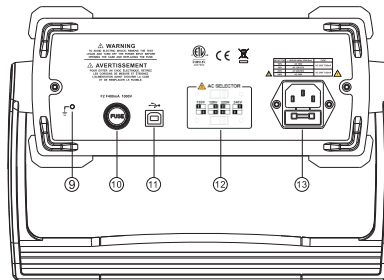
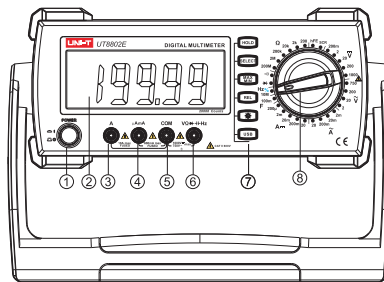
MAX/MIN: MAX/MIN value t button

REL: Relative value measurement button












 : Backlight button

USB: USB communication button

8. Function switch
9. Grounding terminal
10. Fuse socket
11. USB interface
12. Switch to select AC voltage
13. Socket



Symbols on meter

| | |
|---|---|
|  | Power on |
|  | Power off |
|  | Direct current |
|  | Alternating current |
|  | Ground Terminal |
|  | Caution, possibility of electric shock |
|  | Warning or caution, To ensure safe operation and service of this meter, follow all warnings and instructions detailed in this manual. |
|  | USB port |
|  | Do not place equipment and its accessories in the trash. Items must be properly disposed of in accordance with local regulations. |
|  | Comply with European Union Directive |
|  | Conforms to UL STD. 61010-1, 61010-030, Certified to CSA STD. C22.2 No. 61010-1, 61010-030. |
| CAT II | It is applicable to test and measuring circuits connected directly to utilization points (socket outlets and similar points) of the low-voltage MAINS installation. |

VII: Measurement operation instructions

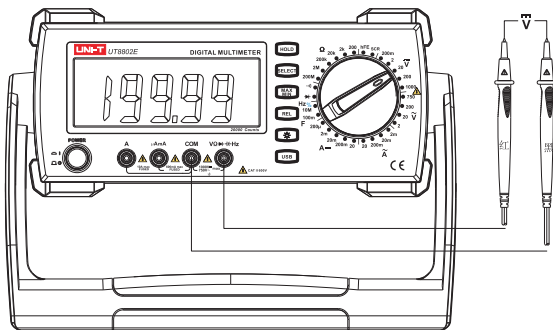


Figure 1

1.Measurement of DC voltage (see Figure 1)

1. Insert the black test lead into the COM socket, the red test lead into the V socket.
2. Switch the function knob to “V” position. And then connect test leads with the power supply (for measuring open circuit voltage) or the load (for measuring load voltage drop), the polarity will be displayed on the screen.

⚠ Note:

- Do not input any voltage higher than 1000V. Otherwise there is a risk that the instrument might get damaged. When measuring high voltage, pay attention to avoid electric shock.
- To disconnect probe and measured circuit then remove probe from input end after finishing all measurement operations.

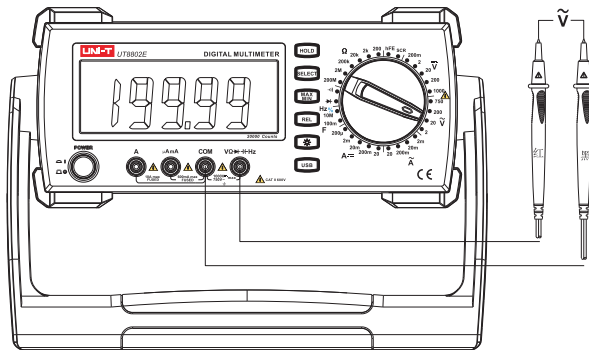


Figure 2

2.Measurement of AC voltage (see Figure 2)

1. Insert the black test lead into the COM socket, the red test lead into the V socket.
2. Switch the function knob to “V” position. Connect test leads with the power supply (for measuring open circuit voltage) or the load (for measuring load voltage drop).

⚠ Note:

- Do not input any voltage that is higher than 750V. Otherwise there is a risk that the instrument might get damaged. When measuring high voltage, pay attention to avoid electric shocked.
- To disconnect probe and measured circuit then remove probe from input end after finishing all measurement operations.

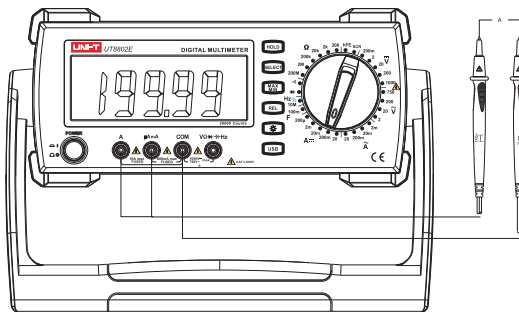


Figure 3

3.Measurement of AC /DC current (see Figure 3)

1. Insert the black test lead into the COM socket, the red test lead into the “ μ A” “mA” or “A” socket.
2. Switch the function knob to “A-” or “A~” position, then connect the instrument in series with the circuit to be tested.

⚠ Note:

- Before measuring current, the power supply of the circuit should be switched off, and discharge all capacitors.
- If the range of the current to be measured is unknown, the maximum range should be chosen, and gradually decreased.
- If the current to be tested is greater than 10A, the measurement time should be less than 30 seconds and the wait time of performing the next test should be more than 15 minutes.
- Disconnect probes and remove from input end after all measurements are completed.

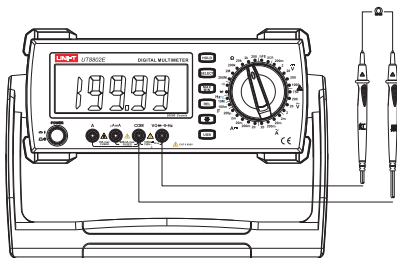


Figure 4

4.Measurement of Resistance (see Figure 4)

1. Insert the black test lead into the COM socket, the red test lead into the Ω socket.
2. Switch the function knob to Ω position, then connect test leads with the resistance to be measured.

⚠ Note:

- Before measuring current, the power supply of the circuit should be switched off, and get the residual charge stored in the high voltage capacitor fully discharged.
- In low resistance measurement, the test leads will bring about 0.1 Ω to 0.2 Ω resistance measurement error. In order to obtain accurate readings, the relative measurement function can be used. Short circuit the test leads and press Δ button to enter the REV test mode.
- If the measurement in shorting the test leads is more than 0.5 Ω , please check the test leads if they are behaving abnormally
- When measuring the resistance above 1 M ohm, it may take a few seconds to make the readings steady. This is the normal phenomenon for measuring high resistance. In order to obtain the steady data quickly, it is recommended to use the short test wire to measure high resistance.
- Do not input the voltage higher than AC 30Vrms or DC 60V. Otherwise there is a risk that the instrument might get damaged.
- To disconnect probe and measured circuit then remove probe from input end after finishing all measurement operations.

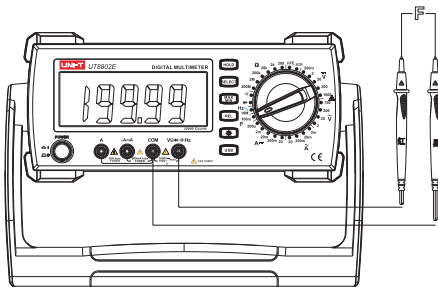


Figure 5

5. Measurement of capacitance (see Figure 5)

1. Insert the black test lead into the COM socket, the red test lead into the F socket.
2. Switch the function knob to “F” position, and then connect test leads with the capacitor to be measured.

⚠ Note:

- If the measurement value is out of range (too small or too large), the “OL” symbol will be displayed on the screen.
- If the capacitance to be tested is too small, the REL measuring mode should be used in order to avoid the influence coming from distributed capacitance so as to get the correct reading.
- If the capacitance to be tested is greater than 600 μF , in order to get the correct reading, it will take a long time to finish the measurement.
- Before the measurement, make sure that the residual charges stored in the high voltage capacitor are fully discharged in order to avoid the risk that the instrument might get damaged.
- Do not input the voltage higher than AC 30 Vrms or DC 60V. Otherwise there is a risk that the instrument might get damaged.
- To disconnect probe and measured circuit then remove probe from input end after finishing all measurement operations.

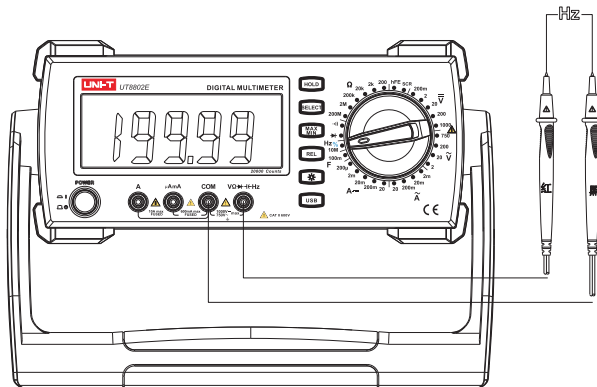


Figure 6

6. Measurement of Frequency (see Figure 6)

1. Insert the black test lead into the COM socket, the red test lead into the “Hz” socket.
2. Switch the function knob to “Hz” position, and then connect test leads with signal source to be tested.

⚠ Note:

- Do not input the voltage higher than AC 36 Vrms. Otherwise there is a risk that the instrument might get damaged.
- To disconnect probe and measured circuit then remove probe from input end after finishing all measurement operations.

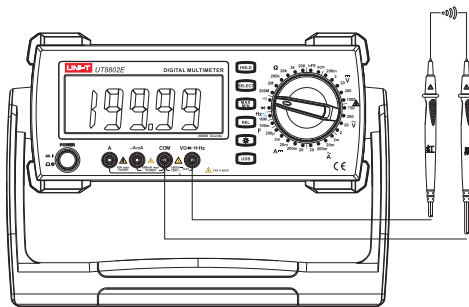


Figure 7

7. Measurement of Continuity (see Figure 7)

1. Insert the black test lead into the COM socket, the red test lead into the “Ω” socket.
2. Switch the function knob to “ Ω ” position, and then connect test leads with the circuit to be tested.
3. If the resistance to be tested is less than 50Ω , the buzzer goes off.
4. If the resistance to be tested is more than 100Ω , the buzzer doesn't go off.

⚠ Note:

- Before measuring, the power supply for the circuit must be turned off and the residual charge stored in the capacitors should be fully discharged.
- If the measured resistance is less than 50Ω , the measured circuit will be regarded as being in good conduction status, and the buzzer goes off.
- If the measured resistance is greater than 100Ω , the measured circuit will be regarded as in open status.
- Do not input the voltage higher than AC 36 Vrms. Otherwise there is a risk that the instrument might get damaged.
- To disconnect probe and measured circuit then remove probe from input end after finishing all measurement operations.

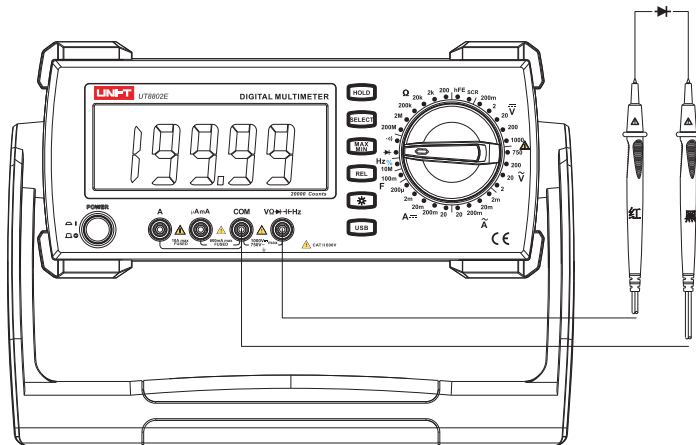


Figure 8

8. Measurement of Diode (see Figure 8, Figure 9)

Method one:

1. Insert the black test lead into the COM socket, the red test lead into the “ $\rightarrow|$ ” socket.
2. Switch the function knob to “ $\rightarrow|$ ” position, and then connect test leads with the Diode to be tested.
When the $\leftarrow|$ symbol is displayed on screen, where the red test lead is connecting is the positive, where the black test lead is connecting is the negative.
When the $\rightarrow|$ symbol is displayed on screen, where the red test lead is connecting is the negative, where the black test lead is connecting is the positive.

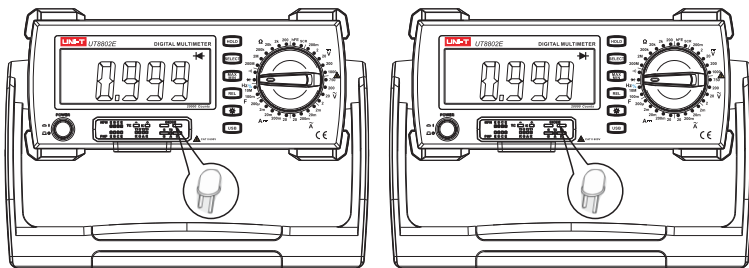


Figure 9

Method two:

1. Insert adaptor UT-S03A into where it is required to be loaded on the instrument (Figure 9).
2. Insert the Diode to be test into the adaptor UT-S03A

When the \blacktriangleleft symbol is displayed on screen, the right of the socket is the positive. The left of the socket is the negative.

When the \blacktriangleright symbol is displayed on screen, the right of the socket is the negative. The left of the socket is the positive.

Note:

If the Diode to be tested is NG, symbol "OL" or "0.000" will be displayed on screen.

Before measuring, the power supply for the circuit must be turned off and the residual charge stored in the capacitors should be fully discharged.

The OCV to be used to test diode is about $\pm 9V$.

Do not input the voltage higher than AC 36 Vrms, DC 48V. Otherwise there is a risk that the instrument might get damaged.

To disconnect probe and measured circuit then remove probe from input end after finishing all measurement operations.

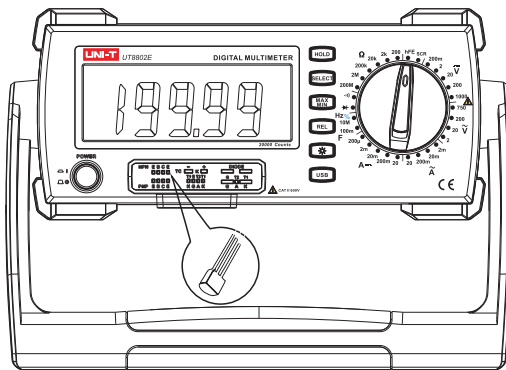


Figure 10

9. Measurement of Transistor (see Figure 10)

1. Insert adaptor UT-S03A into where it is required to be loaded on the instrument.
2. Switch the function knob to "SCR" position.
3. Insert transistor to be tested into adaptor UT-S03A according with the polarity indicated on the adaptor.

⚠ Note:

- Before measuring, the power supply for the circuit must be turned off and the residual charge stored in the capacitors should be fully discharged.
- Do not input the voltage higher than AC 36 Vrms, DC 48V. Otherwise there is a risk that the instrument might get damaged.
- To disconnect probe and measured circuit then remove probe from input end after finishing all measurement operations.

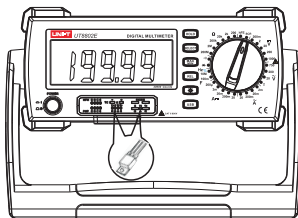


Figure 11

10. Measurement of SCR (see Figure 11)

1. Insert adaptor UT-S03A into where it is required to be loaded on the instrument.
2. Switch the function knob to "SCR" position.
3. Insert transistor to be tested into adaptor UT-S03A according with the polarity indicated on the adaptor.
4. The below contents will be displayed on screen.

| Voltage displayed on LCD | SCR Polarity prompt symbol | Judgment | SCR Polarity |
|--------------------------|----------------------------|------------------------------|--------------|
| 0.1V~2V | ⊙ ⊙ ⊙ | Good | Bipolar |
| 0.1V~2V | ▶ ⊙ | Good | Unipolar |
| ERR | --- | SCR NG | Unknown |
| OL | --- | SCR NG or not well connected | Unknown |

⚠ Note:

- Before measuring, the power supply for the circuit must be turned off and the residual charge stored in the capacitors should be fully discharged.
- Do not input the voltage higher than AC 36 Vrms, DC 48V. Otherwise there is a risk that the instrument might get damaged.
- To disconnect probe and measured circuit then remove probe from input end after finishing all measurement operations.

VIII. Technical specification

Error limit : \pm (% reading + digit), one year guarantee period

Ambient temperature: 18~28 °C

Ambient humidity: no more than 75%RH

1. DC voltage

| Function | Range | Resolution | Accuracy |
|----------|-------|-------------|---------------------------|
| | | | \pm (% reading + digit) |
| DCV | 200mV | 10 μ V | \pm (0.1%+5) |
| | 2V | 100 μ V | \pm (0.1%+3) |
| | 20V | 1mV | |
| | 200V | 10mV | |
| | 1000V | 0.1V | \pm (0.2%+5) |

● Input impedance : approximately 10M ohm.

● Max input voltage : 1000v

2. AC voltage

| Function | Range | Resolution | Accuracy |
|----------|-------|-------------|---------------------------|
| | | | \pm (% reading + digit) |
| DCV | 2V | 100 μ V | \pm (0.5%+20) |
| | 20V | 1mV | |
| | 200V | 10mV | |
| | 750V | 0.1V | \pm (0.8%+40) |

● Input impedance: approximately 10 M ohm

● Max input voltage : 750Vrms

● Frequency response : 40Hz~1KHz

● Display: sine wave RMS (average response)

● There would be some residual readings displayed on LCD screen while without input, but this does not affect the measurement accuracy.

3.DC current

| Function | Range | Resolution | Accuracy |
|----------|-------|------------|----------------------|
| | | | ±(% reading + digit) |
| DCA | 200μA | 10nA | ±(0.5%+20) |
| | 2mA | 100nA | |
| | 20mA | 1μA | |
| | 200mA | 10μA | |
| | 20A | 1mA | ±(1.5%+40) |

If the current to be tested is greater than 10A.

- the measuring time must be less than 30 seconds
- the interval time of must be over 15 minutes.

4.AC current

| Function | Range | Resolution | Accuracy |
|---|-------|------------|----------------------|
| | | | ±(% reading + digit) |
| ACA Frequency response: 40~400Hz | 2mA | 0.1μA | ±(0.8%+40) |
| | 20mA | 1μA | |
| | 200mA | 10μA | |
| | 20A | 1mA | ±(2.0%+40) |

- Frequency response 45Hz~400Hz
- If the current to be tested is greater than 10A ,
the measuring time must be less than 30 seconds
- the interval time of must be over 15 minutes .

5. Resistance

| Function | Range | Resolution | Accuracy |
|----------|-------|------------|----------------------|
| | | | ±(% reading + digit) |
| Ω | 200Ω | 0.01Ω | ±(0.5%+10) |
| | 2kΩ | 0.1Ω | ±(0.5%+10) |
| | 20kΩ | 1Ω | |
| | 200kΩ | 10Ω | |
| | 2MΩ | 100Ω | |
| | 200MΩ | 1kΩ | For reference |

- If the resistance to be tested is greater than 20M , the measured result is only for the reference .

6. Capacitance

| Function | Range | Resolution | Accuracy |
|----------|-------|------------|----------------------|
| | | | ±(% reading + digit) |
| F | 20nF | 1pF | ±(2.5%+10) |
| | 200nF | 10pF | ±(1.5%+10) |
| | 2μF | 100pF | |
| | 20μF | 1nF | |
| | 200μF | 10nF | |
| | 2mF | 100nF | ±(10%+10) |
| | 20mF | 1μF | |
| | 100mF | 10μF | For reference |

If the capacitance to be tested is greater than 20F.
the measured result is only for the reference .

7. Frequency / Duty cycle

| Function | Range | Resolution | Accuracy |
|----------|----------------------|------------|----------------------|
| | | | ±(% reading + digit) |
| Hz | 200Hz | 0.01Hz | ±(1%+5) |
| | 2kHz | 0.1Hz | |
| | 20kHz | 1Hz | |
| | 200kHz | 10Hz | |
| | 2MHz | 100Hz | |
| | 10MHz | 1kHz | |
| % | 10Hz~10kHz 5%~99% | 0.1% | ±(1.5%+2) |

- ≤ 100 kHz : $100 \text{ m Vrms} \leq \text{Amplitude} \leq 20 \text{ Vrms}$
- 100 kHz~1 MHz : $200 \text{ m Vrms} \leq \text{Amplitude} \leq 20 \text{ Vrms}$
- 1 MHz~5 MHz : $500 \text{ m Vrms} \leq \text{Amplitude} \leq 20 \text{ Vrms}$
- 5 MHz~10 MHz : $900 \text{ m Vrms} \leq \text{Amplitude} \leq 20 \text{ Vrms}$

8. Diode / Triode / SCR / Continuity





| Function | Range | Resolution | Accuracy |
|------------|--------------|--------------|----------------------|
| | | | ±(% reading + digit) |
| Diode | 9.0V | 1mV | 10% |
| SCR | 9.0V | 1mV | 10% |
| Triode hFE | 2000 | 1 β | Not specified |
| Continuity | 100 Ω | 0.1 Ω | Not specified |

- If the measured resistance is greater than 100 Ω , the circuit is regarded as open status.
- The buzzer will not go off.
if the measured resistance is less than 50 Ω , the circuit is regarded as in good conduction status, the buzzer will go off.
- SCR is the abbreviation of "Silicon Controlled Rectifier"

IX. Power supply setting and fuse replacement (see Figure 12)

1. Power supply settings:

- 1) Turn the red switch to the corresponding position
- 2) Setting steps:
 - a. Unplug the power cord
 - b. Turn the red switch to corresponding position
 - c. Selectable positions are shown below

| Position | Voltage | Demonstration | Description |
|----------|-----------|---|-----------------------------|
| 1 | 100V |  | Input corresponding voltage |
| 2 | 120V/127V |  | |
| 3 | 220V/230V |  | |
| 4 | 240V |  | |

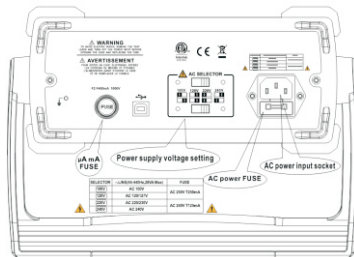


Figure 12

2. Fuse replacement:

- 1) Unplug the test leads from the instrument.
- 2) Turn off the power supply for the instrument
- 3) Open the fuse housing with a screwdriver.
- 4) Replaced the fuse with new one.

UNI-T®

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