(14) Continuity Test

Range	Resolution	Remark
•))	0.01Ω	Open circuit voltage is around 3V; when the buzzer selects short circuit for sound warning, the resolution is less than 10Ω. The buzzer continuously sounds, the resolution is greater than 50Ω. The buzzer does not sound. When the buzzer selects open circuit for sound warning, the resolution is greater than 50Ω. The buzzer continuously sounds, the resolution is less than 10Ω. The buzzer does not sound.

• Overload protection: 1000V

(15) Diode Test

Range	Resolution	Remark
⊣◀	0.0001V	Open-circuit voltage is around 3V. The forward voltage drop value of the measured PN junction is approximately ≤ 3V. When the buzzer activates, it will beep briefly for the normal semiconductor junction; If the semiconductor junction shorts out, it will beep continuously. Silicon PN junction drops between 0.5～0.8V as the normal value.

• Overload protection: 1000V

IX. Measurement Operation

1. Meter Power Control

1) Manually start up and shut down the meter power.

When the meter is off, long press ⏻ to start the meter. When the meter is on, long press ⏻ to shut it off.
The meter cannot be powered off when charging.

2) Indicators for Battery Capacity

The meter is powered by lithium battery. The indicators for battery capacity are in the upper right corner of display to indicate the relative conditions of battery. Various indicators for battery capacity are described in the following table.

Meaning	Battery Capacity
	Full capacity
	Half capacity
	Empty

When the battery capacity is lower than 3% of full capacity, the meter will automatically shut down.

3) Backlight Control

If the display is not visible in low-light situations， press to switch the backlight brightness. Long press the key to turn off the backlight and enter power saving mode. When the backlight is off, the green light flashes to indicate that the meter is still collecting data. Press any key or turn the rotary switch to turn on the backlight again.

4) Auto Power-off

If there is no turning of rotary switch or key action within the time set in the menu item " POWE OFF " under the meter setting "AUTO POWER SAVE ", the meter will automatically shut down. Long press ⏻ to restart the meter. When the item "POWE OFF" is set as OFF, Auto power-off will be completely prohibited.

5) Power Saving Mode

Set the control time of automatic reduction for backlight brightness and off time for display via the meter menu bar "AUTO POWER SAVE" to enter power-saving mode. Please refer to the detailed description about the meter settings.

2. Meter settings

Press the function key SETUP (Menu) to set and view the relevant information on the meter. Press the cursor keys to select relevant menu items of the meter as follows.

1) Keypad Tone

Set as ON to enable key sound and OFF to disable key sound, meanwhile the buzzer symbol in the upper right corner will appear or disappear for its ON and OFF.

2) Lead Alarm Buzzer

Set as ON to enable the alarm sound for wrong insertion by probe and OFF to disable the alarm sound for mis-inserted probe.

3) Communication

Set as ON to enable USB or Bluetooth communication while a symbol will appear in the upper left corner. Set as OFF to disable USB or bluetooth communication while the symbol in the upper left corner will disappear.

4) Date & Time

Press the function key SET (Menu) to set the date and time within the meter. Press or to select the required edit position, and press or to enter different numbers, then press the function key 0K (Menu) to confirm. To cancel the settings, press the function key CANCEL (Menu).

5) AUTO POWER SAVE

Press the function key SET (Menu) to set the control time of automatic reduction for backlight brightness,off time of display and auto power-off time. Press or to move the cursors to select different items. Press or to enter the time for power saving mode of this item with minute unit.

Menu Item	Description	Set Value
Brightness Down	Control time of automatic reduction for backlight brightness	0N: 1-60 Min OFF: This function is disabled
Display Off	Off time of display	ON: 1-60 Min OFF: This function is disabled
Power Off	Auto power-off time	ON: 1-60 Min OFF: This function is disabled

Press the function key 0K (Menu) to confirm the above settings. To cancel the settings, press the function key CANCEL (Menu)

6) More Settings

Press the function key ENTER (Menu) to set the languages of help information, format memory, reset the meter settings, check product model, serial number and available memory space. Press the cursor keys to select the relevant menu items of the meter as follows.

- Help Menu Language

  Press the function key SET (Menu) to set the language for help information. Press or to select a different language. Then press the function key 0K (Menu) to confirm.
  To cancel the settings, press the function key CANCEL (Menu).

- Memory Format

  Press the function key FORMAT (Menu) to enter memory format, then press the function key YES (Menu) to confirm.
  To cancel the format, press the function key NO (Menu).

- Reset All Setting

  Press the function key RESET (Menu) to reset the menu with default settings, then press the function key YES (Menu) to confirm. To cancel the reset, press the function key NO (Menu).

- About

  Press the function key ABOUT (Menu) to check product model, serial number and available memory space.

3. AC Voltage

1) Insert the red test lead into the V terminal and the black test lead into the COM terminal.
2) Set the rotary switch to Ṽ or mṼ as shown in Figure 5. Connect the test leads to the power or load under test in parallel.
3) Directly read the measured voltage values on the display. True virtual values are displayed for AC measurement.
4) Press the function key MENU (Menu) to enter one menu item in which basic AC voltage measurement can be modified. Press the cursor keys to select menu items. The red cursor key indicates the selected item, then press F1 to enter the corresponding measuring mode, press F2 to enter relative value measurement, press F3 to set dbm resistance, and press F4 to close the window of additional function.

⚠ Attention:

- Do not input a voltage higher than 1000V. Higher voltage may be measured but it poses risk to damage the meter.
- When measuring high voltage, special care should be taken to avoid electric shock.
- After completing all the measuring operations, disconnect the connection between the test leads and the circuit under test.
- The response mode of AC coupled true RMS is adopted for the conversion of AC with sinusoidal input calibration. The accuracy of non-sinusoidal wave must be adjusted based on the following:

For crest of 1.4～2.0, the accuracy shall be added 1.0%.
For crest of 2.0～2.5, the accuracy shall be added 2.5%.
For crest of 2.5～3.0, the accuracy shall be added 4.0%.

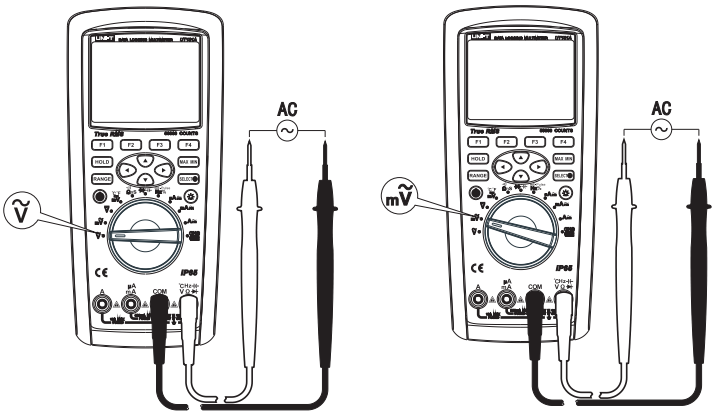


Figure 5

4. DC Voltage

1) Insert the red test lead into the V terminal and the black test lead into the COM terminal.
2) Set the rotary switch to DC V or DC mV as shown in Figure 6. Connect the test leads to the power or load under test in parallel.
3) Directly read the measured voltage values on the display.

4) Press the function key MENU (Menu) to enter one menu item in which basic DC voltage measurement can be modified. Press the cursor keys to select menu items. The red cursor key indicates the selected item, then press F1 to enter the corresponding measuring mode, press F2 to enter relative value measurement, and press F4 to close the window of additional function.

⚠ Attention:

- Do not input a voltage higher than 1000V. Higher voltage may be measured but it poses risk to damage the meter.
- When measuring high voltage, special care should be taken to avoid electric shock.
- After completing all the measuring operations, disconnect the connection between the test leads and the circuit under test.

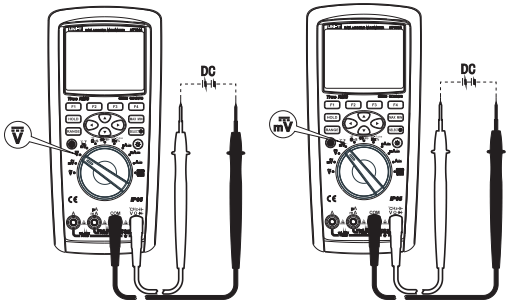


Figure 6

5. AC and DC Current

1) Insert the red test lead into the μAmA or A terminal and the black test lead into the COM terminal.
2) Set the rotary switch to the position as shown in Figure 7. Press the key SEECT to select the required AC or DC to be measured. Connect the test leads to the test circuit in series.
3) Directly read the measured current values on the display. True virtual values are displayed for AC measurement.
4) Press the function key MENU (Menu) to enter one menu item in which basic AC or DC current measurement can be modified. Press the cursor keys to select menu items. The red cursor key indicates the selected item, then press F1 to enter the corresponding measuring mode, press F2 to enter relative value measurement, and press F4 to close the window of additional function.

⚠ Warning

- Before connecting to the test circuit in series, turn off the power to the circuit first and discharge all the high-voltage capacitors.
- Use proper input terminals and functions for measurement. If the current size cannot be estimated, the range of large current should be measured first.
- When the test lead is inserted in the input terminal of current, do not connect its test prod to any circuit in parallel, it will blow the fuses within the meter and damage the meter.

- After completing all the measuring operations, disconnect the connection between the test leads and the circuit under test.

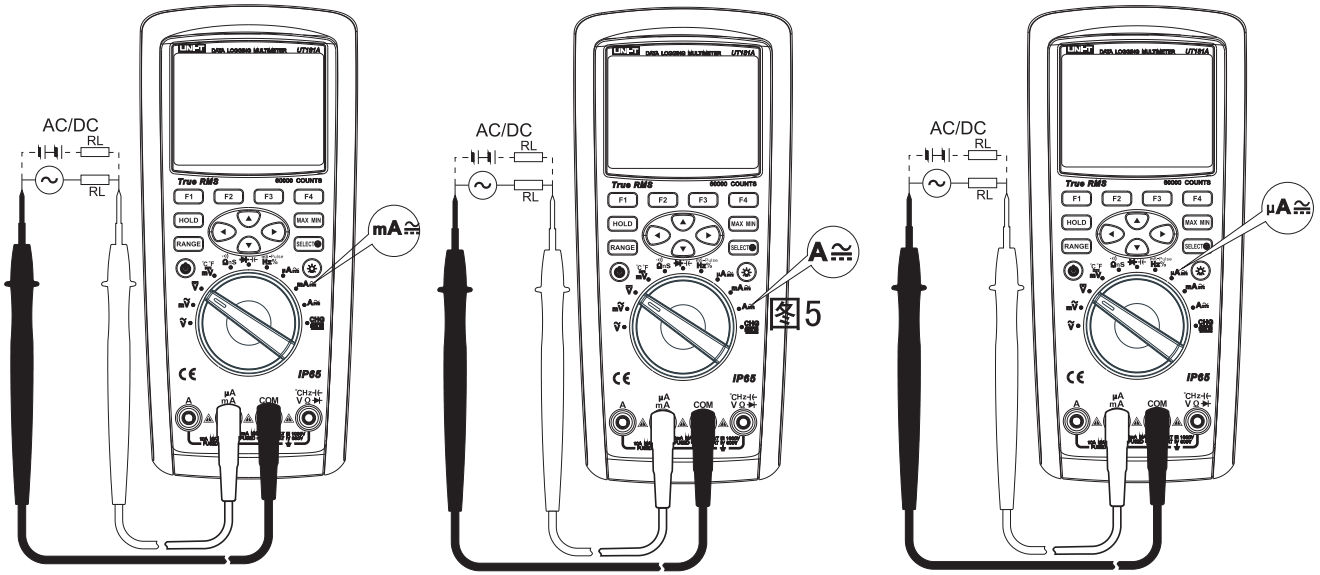


Figure 7

6. Resistance

1) Insert the red test lead into the **Ω** terminal and the black test lead into the COM terminal.
2) Set the rotary switch to the measurement **Ω nS** ·)) 、 and current **Ω** is the default resistance measurement as shown in Figure 8. Connect the test leads to both ends of the measured resistance.
3) Directly read the measured resistance values on the display.

⚠ Attention:

- If the open circuit of measured resistance or resistance value exceeds the maximum range of the meter,“0L” will show on the display.
- When measuring the in-circuit resistance, all the power within the measured circuit must be shut off before measurement and all the capacitors must be discharged to ensure a correct measurement.
- When measuring low resistance, the test lead will bring about measurement errors of resistance between 0.10 to 0.20. To obtain accurate readings, relative measurement can be adopted. First short the input test lead, then press the key MENU and press F2 to enter the relative measurement. Perform the measurement of low resistance after the meter automatically subtracts the display value of shorted test lead.
- If the resistance value is greater than 0. 50 for a shorted test lead, the test lead should be checked to see any loose or other factors.
- When measuring the resistance above 1MΩ, the readings require a few seconds to be stable. It is normal for the measurement of high resistance. In order to obtain stable readings, short test lines can be used for the measurement.
- Do not input a voltage higher than 30V in AC(rms),AC(peak 42V) or 60V in DC to avoid personal injury.
- After completing all the measuring operations, disconnect the connection between the test leads and the circuit under test.

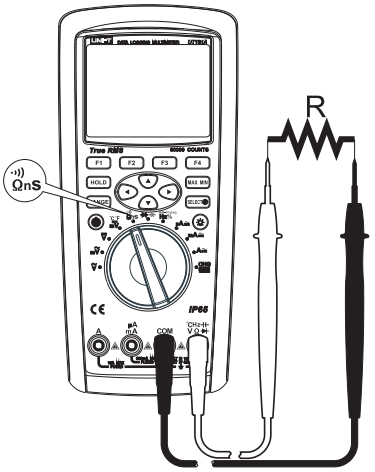


Figure 8

7. Conductance

1) Insert the red test lead into the Ω terminal and the black test lead into the COM terminal.
2) Set the rotary switch to the measurement Ω nS ·)) . press the key SELECT to select conductance measurement 60nS. Connect the test leads to both ends of the measured resistance as shown in Figure 8.
3) Directly read the measured conductance value on the display.

⚠ Attention:

- When measuring the in-circuit resistance, all the power within the measured circuit must be shut off before measurement and all the capacitors must be discharged to ensure a correct measurement.
- Do not input a voltage higher than 30V in AC(rms),AC(peak 42V) or 60V in DC to avoid personal injury.
- After completing all the measuring operations, disconnect the connection between the test leads and the circuit under test.

8. Capacitance

1) Insert the red test lead into the ⊣⊢ terminal and the black test lead into the COM terminal.
2) Set the rotary switch to the measurement ⊣⊢ 、 press the key SELECT to select capacitance measurement. Connect the test leads to both ends of the measured capacitance as shown in Figure 9.
3) Directly read the measured capacitance value on the display.

⚠ Attention:

- If the measured capacitance shorts or capacitance value exceeds the maximum range of the meter, “0L” will show on the display.
- For the measurement of capacitance within small range, relative measurement REL should be adopted to avoid the influence of distributed capacitance for correct readings.
- For the measurement of capacitance greater than 600 μF, it needs longer time for correct readings.
- To ensure the measuring accuracy, the capacitor should be discharged completely then put into the meter to measure especially for a capacitor with high voltage thus to avoid damage to the meter and personal injury.
- Do not input a voltage higher than 30V in AC(rms),AC(peak 42V) or 60V in DC to avoid personal injury.
- After completing all the measuring operations, disconnect the connection between the test leads and the capacitor under test.

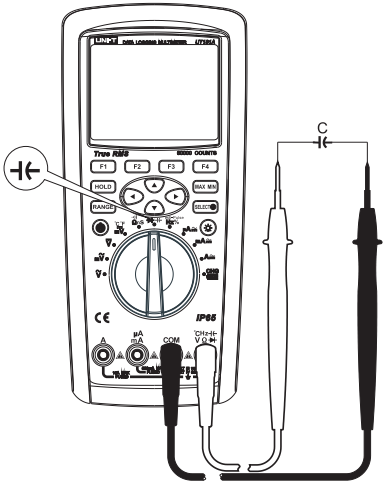


Figure 9

9. Continuity test

1) Insert the red test lead into the Ω terminal and the black test lead into the COM terminal.
2) Set the rotary switch to the measurement Ω nS ·ıı)), press the key SELECT to select the continuity test ·ıı)) . Connect the test leads to both ends of the measured resistance as shown in Figure 8. Press the function key MENU (Menu) to enter the menu items. If pressing the key SHORT (Menu), then the buzzer selects short circuit for alarm sound, the measured resistance between both ends <10Ω, the buzzer continuously sound > 50Ω. The buzzer does not sound. If pressing the key OPEN (Menu), then the buzzer selects open circuit for alarm sound, the measured resistance between both ends > 50Ω, the buzzer continuously sound <10Ω. The buzzer does not sound.
3) Directly read the measured resistance value on the display.

⚠ Warning

- When measuring the in-circuit resistance, all the power within the measured circuit must be shut off before measurement and all the capacitors must be discharged to ensure a correct measurement.
- Do not input a voltage higher than 30V in AC(rms),AC(peak 42V) or 60V in DC to avoid personal injury.
- After completing all the measuring operations, disconnect the connection between the test leads and the circuit under test.

10. Diode

1) Insert the red test lead into the ⊣◀ terminal and the black test lead into the COM terminal. The polarity of red test lead is "+" and "-" for black test lead.
2) Set the rotary switch to the measurement ⊣◀ ⊣⊢ and the diode measuring mode ⊣◀ is default. Connect the test leads to both ends of the measured diode as shown in Figure 10. Directly read the approximate forward PN junction voltage of the measured diode on the display.

3) Press the function key MENU(Menu) to enter menu items. If pressing the key ALARM, the buzzer starts up. It will beep briefly for the normal semiconductor junction; If the semiconductor junction shorts out, it will beep continuously. Silicon PN junction drops between 0.5～0.8V as the normal value. If pressing the key NORMAL, the buzzer will not start up.

⚠ Attention:

- If the measured diode is in open circuit or the polarity is reversed, “0L” will display.
- When measuring the in-circuit diode, all the power within the measured circuit must be shut off before measurement and all the capacitors must be discharged.
- Open-circuit voltage of diode test is around 3V.
- Do not input a voltage higher than 30V in AC(rms),AC(peak 42V) or 60V in DC to avoid personal injury.
- After completing all the measuring operations, disconnect the connection between the test leads and the circuit under test.

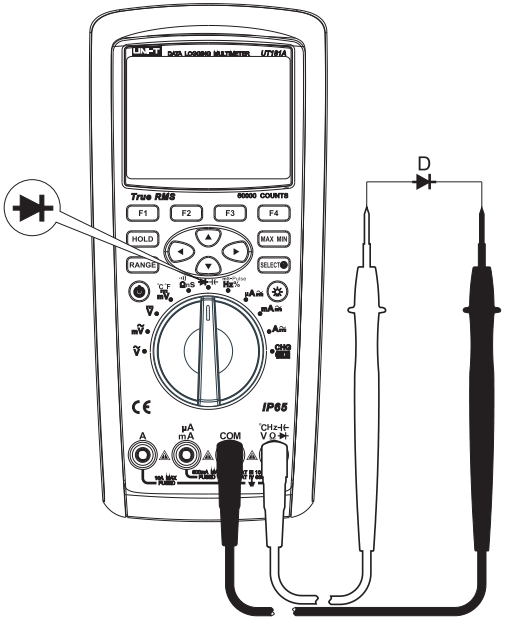


Figure 10

11. Frequency/Duty Cycle Measurement /Pulse Width

1) Insert the red test lead into the V terminal and the black test lead into the COM terminal.
2) Set the rotary switch to the measurement Hz% ms-Pulse, press the key SELECT to select Hz or Duty% or ms-Pulse. Connect the test leads to the signal source under test in parallel as shown in Figure 11.
3) Directly read the measured values of frequency or duty cycle or pulse width on the display.

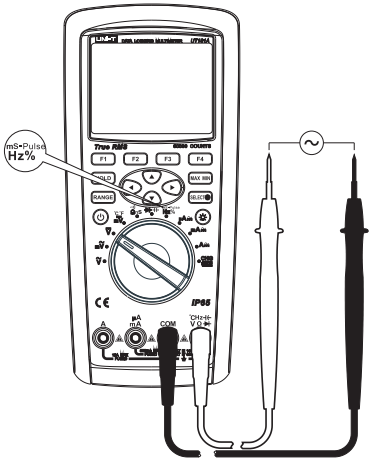


Figure 11

⚠Attention:

- Simulation bar displays the frequency of the measured signal for duty cycle and pulse width.
- Do not input a voltage with higher frequency than 30Vrms to avoid personal injury.
- After completing all the measuring operations, disconnect the connection between the test leads and the circuit under test.

12. Temperature

1) Set the rotary switch to the measurement " mV̄ ℃ ℉ ",then press the key SELECT to select Celsius °C or Fahrenheit °F. Insert the temperature connector into four terminals and connect two temperature probes to the temperature connector. The probes detect the surface of the object under test as shown in Figure 12.
2) Directly read Celsius or Fahrenheit temperature values of the two surfaces under test on the display.
3) Press the function key MENU (Menu) to open one menu item F2 in which basic temperature measurement can be modified to enter the relative measuring mode. Press F4 to close the window of additional function. Press the cursor keys to select menu items. The red cursor key indicates the selected item, then press F1 to enter corresponding value measurement. Press F2 to enter relative value measurement, and press F4 to close the window of additional function.

⚠ Attention:

- The ambient temperature for the meter shall not exceed the range from 18° C to 28 °C, otherwise it will cause measurement errors. The measurement effects are more obvious at low temperatures.
- Remove the temperature probes after completing all the measuring operations.
- Point contact K type (chromel-silicel) thermocouple (only applicable to the measurement when temperature is below 230 ° C).

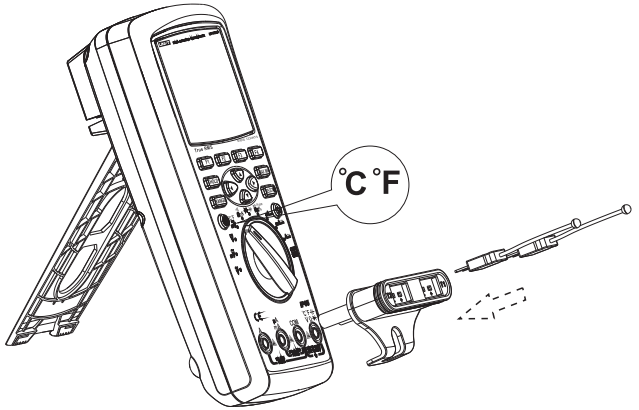
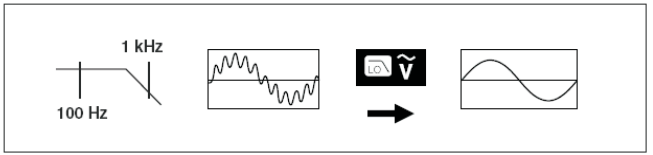


Figure 12

13. LPF Measurement

1) Insert the red test lead into the V terminal and the black test lead into the COM terminal.
2) Set the rotary switch to Ṽ . Connect the test leads to the power or load to be tested in parallel as shown in Figure 5.
3) Press the function key MENU (Menu) to enter one menu item. Press the cursor keys to select Low Pass, then press the function key (Menu) Low Pass to enter LPF measuring mode.
4) The meter performs the measurement in AC mode. The AC signals go through a filter which holds up the voltage higher than 1KHz. As shown in the following figure, the low-pass filter can measure the composite signals of sinusoidal wave generated by inverter and variable-frequency motor.



⚠ Attention:

- To avoid electric shock or personal injury, do not use low-pass filter to verify hazardous voltage, for the voltage over the indicated value may exist. First, measure the voltage in the case of disconnecting the filter to see any hazardous voltage. Then select the filter function.