

3) AC measurement value is true RMS.

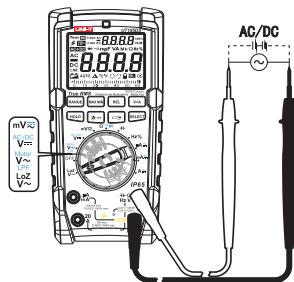
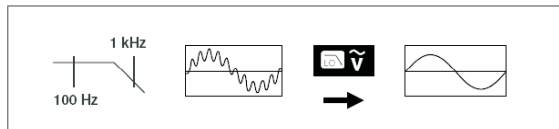


Figure 1

2. Low Pass Filter (LPF) Measurement (for UT195DS)

- 1) Parallel the meter to the load for measurement.
- 2) In ACV mode, press SELECT button to enter LOW PASS FILTER, this filter can intercept voltage higher than 1kHz. As shown in the following figure, the low pass filter can measure the combined sine wave signal generated by the inverter and variable frequency motor.




3. PEAK Value Measurement (for UT195DS)

- 1) Parallel the meter to the load for measurement.
- 2) Press PEAK button once to activate the peak value detection function. Response time of capture is $250 \mu s$, it can precisely measure the transient values of P-MAX and P-MIN. Long press PEAK button to exit peak measurement.

4. MOTOR Phase Sequence Measurement Function (See Figure 2)

- 1) Parallel the meter to the load for measurement.
- 2) In ACV mode, long press SELECT button for no less than 2 seconds to enable the MOTOR phase rotation measurement function, at this moment, LCD screen will show flashing "M" symbol (only for UT195M/UT195DS).
- 3) Set the first voltage source for COM terminal, fix the black probe at L3, the red probe will measure L1 for the first time. Wait till the "M" on the LCD is locked, change the red probe to L2 within 5 seconds, now the 1-2-3 symbol will be displayed on LCD, indicating forward rotation phase sequence.
- 4) Set the first voltage source for COM terminal, fix the black probe at L3, the red probe will measure L2 for the first time. Wait till the "M" on the LCD is locked, change the red probe to L1 within 5 seconds, now the 3-2-1 symbol will be displayed on LCD, indicating reverse rotation phase sequence.
- 5) During the measurement, short press SELECT button once to restart the MOTOR measurement (only for UT195DS). Long press SELECT button for at least 2 seconds again to exit the MOTOR phase rotation measurement function.

⚠ Note:

- 1) Phase sequence measurement condition: Above AC 80V, frequency is 40 Hz to 80 Hz, the flashing “” symbol will be displayed on LCD screen and it will keep on waiting if range of frequency response is exceeded.
- 2) Multi-harmonic anti-interference decoding mode is set in the chip of UT195DS products. The high-frequency interference signal will be filtrated by a special filter circuit built in the chip, this will be suitable for the measurement in variable-frequency voltage fields. Measurement phase sequence lock time is about 10s more or less.
- 3) When measuring UT195M products in variable frequency condition, due to the impact of multiple-harmonic PWM, measurement phase sequence lock time is much slower (about 30s more or less), and the frequency range is only suitable from 50 Hz to 80 Hz, and the unstable state of phase sequence measuring may occur.

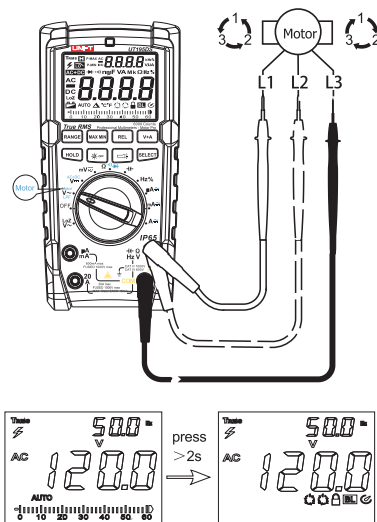


Figure 2

5. LoZ (Low impedance) Measurement

- 1) Parallel the meter to the load for measurement.
- 2) To eliminate the stray voltage, the LoZ (Low impedance is about 300kΩ) function of meter provides a low impedance on the whole conductor circuit so as to obtain much more accurate measurement value. Turn rotation switch to LoZ, meter displays AC voltage in main display.

⚠ Note:

- Do not input voltage higher than 1000Vrms. Much higher voltage is possible to be measured, but the meter may be damaged!
- When measuring high voltage, special attention should be paid to avoid electric shock!
- In low pass filter measurement mode, meter will automatically change to manual mode. Press RANGE button to select corresponding range.
- Measure the known voltage before using the meter to confirm whether the function of the product is correct or not!

6. Resistance and Circuit Continuity Measurement (See Figure 3a+3b)

Parallel the meter to the measured circuit for measurement.

⚠ Note:

- If open circuit or resistance value of measured resistance exceeds the meter maximum range, the “OL” will be displayed.
- When measuring on-line resistance, turn off all power supplies in measured circuit and discharge all residual charges on all capacitors before measurement. In this way, the correct measuring can be assured.

- In low resistance measurement, probe will cause resistance measurement error of about 0.1Ω to 0.2Ω . To obtain precise reading, first short-circuit the probes, then use REL relative measurement mode to ensure measurement accuracy.
- If the resistance value is less than 0.5Ω when probe is in short circuit, check for any loosening or other causes with the probes.
- When measuring high resistance, the reading will be stable after a few seconds. This is normal for high resistance measurement.
- Use resistance measurement function can self-check the built-in fuses, see Figure 3b for more detail.
- Do not input higher than 30V of DC or AC voltage.
- Circuit continuity measurement: If the resistance between two measured ends is more than 50Ω , the circuit will be considered as open, the buzzer will not sound; if the resistance between two measured ends is no more than 10Ω , the circuit is considered as good continuity, the buzzer will sound continuously.

⚠ Note:

- When checking the on-line circuit continuity, turn off all power supplies in measured circuit and discharge all residual charges on all capacitors before measurement.
- Do not input voltage higher than DC or AC 30V to avoid personal injury!

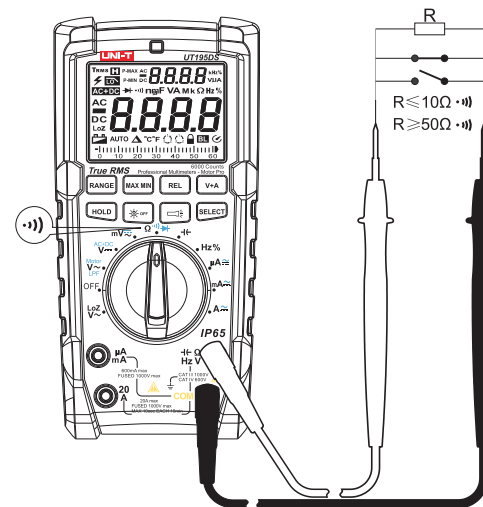


Figure 3a

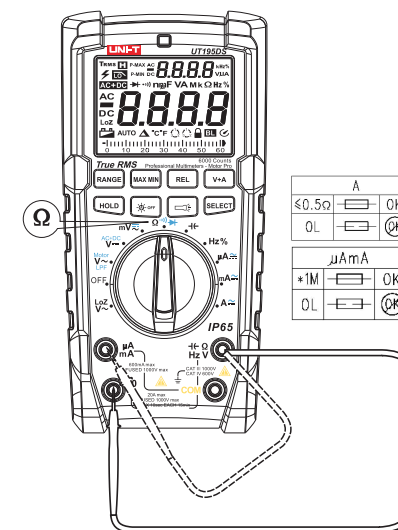


Figure 3b

7. Diode Measurement (see Figure 4)

If measured diode is open circuit or polarity is connected reversely, "OL" will be displayed. For silicon PN-junction, it is a normal value of about 500 ~ 800mV.

⚠ Note:

- When measuring on-line diode, turn off all power supplies in measured circuit and discharge all residual charges on all capacitors before measurement.
- Diode test voltage range is about 3.0V (about 3.5V for UT195E)
- Do not input voltage higher than DC or AC 30V to avoid personal injury!

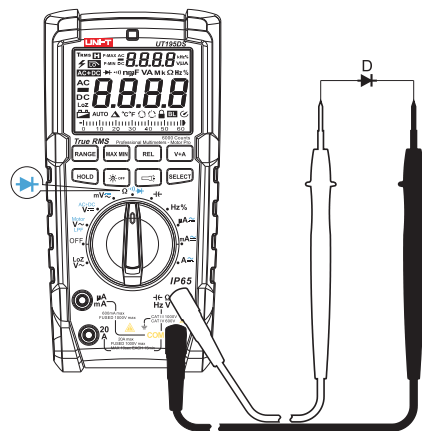


Figure 4

8. Capacitance Measurement (See Figure 5)

Meter will display a fixed reading when there is no input, this is the intrinsic capacitance value in the meter. For small range capacitance measurement, measured value must subtract this value to guarantee the measurement accuracy. For this purpose, the relative measurement REL function of the meter can be used to subtract it automatically so as to measure reading conveniently.

⚠ Note:

- If measured capacitance is short circuit or capacitance value exceeds the maximum range of meter, the "OL" will be displayed.
- For large capacitance measurement, it will take several seconds to measure and this is normal.
- Fully discharge the residual charges of the capacitance before measurement, this is much more important for high voltage capacitance. This is to avoid meter damage and personal

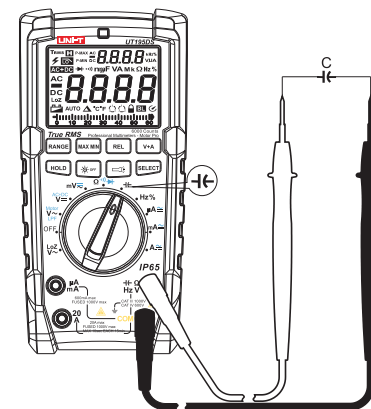


Figure 5

9. Frequency/Duty Ratio Measurement (See Figure 6)

At the frequency measurement stall, press Hz/% button can select frequency/duty ratio measurement mode (for UT195E)

⚠ Note:

- Do not input voltage higher than DC or AC 30V to avoid personal injury!

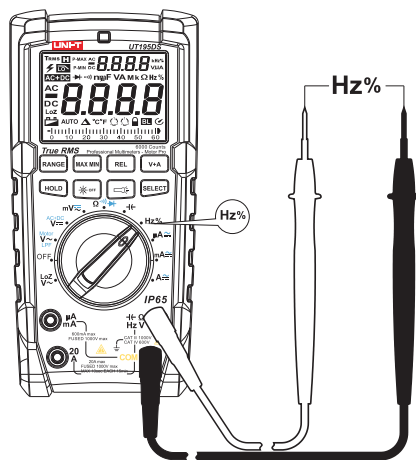


Figure 6

10. Temperature Measurement (Only for UT195M) (See Figure 7)

Temperature sensor: Only for K type (nickel-chromium~nickel-silicon) thermocouple. If "OL" is displayed after powering on the meter, connect K type temperature sensor to measure °C (Celsius) or °F (Fahrenheit).

$$^{\circ}\text{F} = 1.8 \times ^{\circ}\text{C} + 32$$

⚠ Note:

- The point K type (nickel-chromium~nickel-silicon) thermocouple provided by the accessories is only suitable for the temperature measurement below 230°C/446°F.

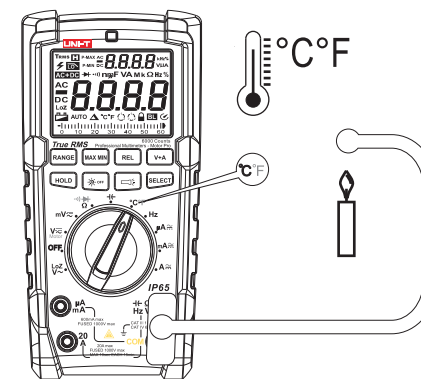


Figure 7

11. AC/DC Current Measurement (See Figure 8)

Connect the meter to the load in series for measurement.
AC measurement display value is true RMS.

⚠ Note:

- Before connecting the meter to the loop to be measured, turn off the power supply in the circuit.
- Proper input port and function position should be used during measurement. If cannot estimate the current, start measurement from high range.
- Fuses are set in 20A and mA/μA input sockets. Do not parallel the probe to any circuit, especially power terminal, for it will damage the meter and endanger personal safety!
- It is available to continuously measure the current up to 10A. When measuring current of 10A~20A, it should not take more than 30 seconds. It is suggested to wait for 15 minutes before measuring the low current continuously with the meter after measuring the current higher than 10A.

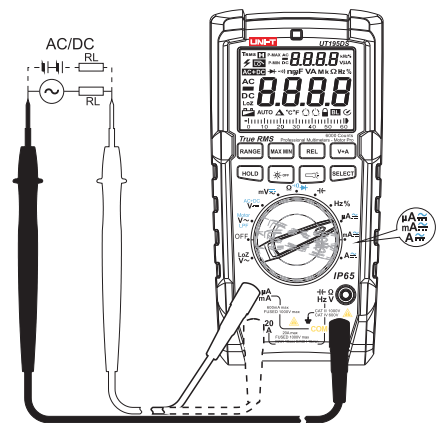




Figure 8

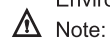
12. Other Functions

- Auto-off: During measurement, if any knob switch is not turned within about 15 minutes, the meter will turn on the auto-off function to save energy. Rotate function switch in auto-off mode, the meter will auto wake up.
- Auto backlight: In case the instrument is placed in a dark environment after turning it on, the backlight function will be turned on immediately. If the instrument is placed in a bright environment again, the backlight function will be turned off in 30 seconds.
In addition, the auto backlight function will be turned off after pressing OFF button while the backlight is on, if it is necessary to restart the backlight function, just turn off the unit and turn it on again.
- Press and hold SELECT button in power off state and power on the meter, auto-off function will be cancelled. Recover auto-off function to restart.
- Buzzer: The buzzer will sound when measured AC voltage is more than 750 V, DC voltage is more than 1000 V and the current value is more than 20 A.
- Low voltage testing: Detect the internal VDD while the power is supplied, when it is less than 7.5V,  or  low battery symbol will be displayed.

X. Technical specifications

Accuracy: $\pm(a\% \text{ reading} + b \text{ number})$, warranty period is 1 year.

Environmental Temperature: 23°C \pm 5°C (73.4°F \pm 9°F) Relative Temperature: $\leq 75\%$



Note:

- *. Accurate temperature condition is 18°C to 28°C, the fluctuation range of ambient temperature is stable in $\pm 1^\circ\text{C}$. If the temperature is $< 18^\circ\text{C}$ or $> 28^\circ\text{C}$, the additional temperature coefficient error is $0.1 \times (\text{specified accuracy})/^\circ\text{C}$

1. DC voltage measurement

Range	Resolution power	Accuracy	Description
600.0mV*	0.1mV	$\pm(0.7\% + 3)$	
6.000V	0.001V	$\pm(0.5\% + 3)$	
60.00V	0.01V	$\pm(0.7\% + 3)$	
600.0V	0.1V		
1000V	1V		
6V~60V	-----	$\pm(1.5\% + 4)\text{AC+DC}$	Only for UT195DS

- Input Impedance: mV range is $\geq 1000\text{M}\Omega$ ($\geq 1000\text{M}\Omega$ for UT195M), other ranges are $10\text{M}\Omega$ (mV range short circuit allows numbers more than 5, and other ranges will be reset to zero)

- Maximum Input Voltage: $\pm 1000\text{V}$

2. AC Voltage Measurement

Range	Resolution power	Accuracy	Description
600.0mV	0.1mV	$\pm(1.0\% + 4)$	
6.000V	0.001V	$\pm(0.7\% + 3)$	
60.00V	0.01V	$\pm(1.0\% + 3)$	
600.0V	0.1V	$\pm(1.0\% + 3)$	
750V	1V	$\pm(1.0\% + 3)$	
Low pass filter measurement 6V~750V		$\pm(2.0\% + 3)$ (Only for UT195DS)	Calculate the deviation based on the measured voltage $\pm(2.0\% + 3)$, then divided by $\sqrt{2}$ and obtain the reading range.
AC LoZ 600.0V	0.1V	$\pm(2.0\% + 3)$	Input resistance $300\text{K}\Omega$
PEAK HOLD	V-peak capture time is $250\mu\text{s}$	$\pm(2\% + 100)$ (Only for UT195DS)	Input value $\times \sqrt{2} \pm(2\% + 100)$
MOTOR 600.0V	0.1V	$\pm(1.5\% + 5)$	Only for UT195M/UT195DS

- Input impedance is about $10\text{M}\Omega$
- Display true RMS.
- Frequency Response: 45~400 Hz (UT195E) 45~1 kHz (UT195M) 45~5 kHz (UT195DS)
- Under the condition of variable frequency power supply, the measured voltage value is only for reference.
- When the measured voltage frequency is greater than 1kHz the accuracy needs to add 5 words

- Allow the meter to stabilize for 1 minute after LoZ (Low impedance 300K) function is used.
- Guaranteed range of accuracy: range of 5~100%, short circuit is allowed to have remain readings less than 10 digits.
- The AC wave peak factor is up to 3.0 in full value (except 1000V range, this range is 1.5 in full value) .
Non-sine waveform:
Wave peak factor is 1.0 to 2.0, accuracy should be added 3.0%(UT195M/UT195DS is 1.0%).
Wave peak factor is 2.0 to 2.5, accuracy should be added 5.0%(UT195M/UT195DS is 2.5%).
Wave peak factor is 2.5 to 2.0, accuracy should be added 7.0%(UT195M/UT195DS is 4.0%).
- Maximum input voltage: 750Vrms

3. Resistance measurement

Range	Resolution	Accuracy
600.0Ω*	0.1Ω	± (1.0%+2)
6.000KΩ	1Ω	± (0.8%+2)
60.00kΩ	10Ω	
600.0KΩ	100Ω	
6.000MΩ	1kΩ	± (1.2%+3)
60.00MΩ	10kΩ	± (2.5%+5)

* Range: Measured value = Displayed value - Probe short circuit value
Overload protection: 1000V

4. Circuit Continuity, Diode Measuring

Range	Resolution	Remarks
	0.1Ω	Set resistance value when circuit is disconnected to more than 50Ω, and buzzer does not sound. Set resistance value when circuit is connected well to no more than 10Ω, and buzzer sound continuously.
	1mV	Open-circuit voltage is about 3.0V (UT195E is about 3.5V) The normal voltage value of silicon PN-junction is about 0.5 to 0.8 V.

Overload protection: 1000V

5. Capacitance measuring

Range	Resolution	Accuracy		
		UT195E	UT195M	UT195DS
6.000nF	1pF	In REL mode ± (4%+10)	In REL mode ± (3%+10)	In REL mode ± (3%+10)
60.00nF~600.0μF	10pF~0.1μF	± (3%+5)	± (3%+5)	± (3%+5)
6.000mF~60.00mF	1μF~10μF	± 10%	± 5%	± 5%

Overload protection: 1000V
It is suggested that measured capacitance no more than 1μF should be measured in REL measurement mode to ensure measurement accuracy.

6. Frequency/Duty Ratio Measurement

Range			Resolution power	Accuracy
UT195E	UT195M	UT195DS		
60.00Hz~10.00MHz	600.0Hz~40.00MHz	100.00Hz~40.00MHz	0.01Hz(0.1H) ~0.01MHz	±(0.1%+4)
0.1%~99.9%	-----	0.1%~99.9%	0.1%	±(2%+5)

⚠ Overload protection: 1000V
 Input amplitude (a): (DC level is zero)
 ≤100 kHz: 200mVrms ≤ a ≤ 30Vrms
 >100 kHz ~ 1 MHz: 600mVrms ≤ a ≤ 30Vrms
 >1 MHz ~ 10 MHz: 1Vrms ≤ a ≤ 30Vrms
 >10 MHz: 1.8Vrms ≤ a ≤ 30Vrms
 Duty ratio%: Only suitable for measurement less than 10kHz,
 Input sensitivity is > 2Vpp @ duty cycle = 10.0% & 95.0%)
 Frequency ≤1kHz Duty cycle 10.0%-95.0%
 Frequency >1kHz Duty cycle 30.0%-70.0%

7. Temperature measurement (Only for UT195M)

Range			Resolution	Accuracy
°C	-40~1000°C	-40~0°C >0~600°C >600~1000°C		
			0.1°C~1°C	±4°C ±(1.5%+4°C) ±(2.0%+4°C)
°F	-40~1832°F	-40~32°F >32~990°F >990~1832°F	0.1°F~1°F	±5°F ±(2.0%+5°F) ±(2.5%+5°F)

⚠ Overload protection: 1000V
 Remarks: The point K type (nickel-chromium~nickel-silicon) thermocouple provided by the accessories is only suitable for the temperature measurement below 230°C/446°F.

8. DC Current Measurement

Range		Resolution power	Accuracy
μA	600.0μA 6000μA		
mA	60.00mA	10μA	±(0.8%+3)
	600.0mA	0.1mA	
A	6.000A	1mA	±(1.0%+3)
	20.00A	10mA	±(1.2%+5)

* Available to continuously measure the current up to 10 A. When measuring the current of 10A~20A, it should not take more than 30 seconds, we suggest to wait for 15 minutes before measuring the low current continuously with the instrument after measuring the current of more than 10A.

⚠ Overload protection:

* μ A mA range: F1 fuse ($\Phi 6 \times 32$) mm FF 600mA H 1000V (CE)

* 20A range: F2 fuse ($\Phi 10 \times 38$) mm FF 11A H 1000V (CE)

9. AC Current Measurement

Range		Resolution power	Accuracy
μ A	600.0 μ A	0.1 μ A	$\pm(1.0+3)$
	6000 μ A	1 μ A	
mA	60.00mA	10 μ A	
	600.0mA	0.1mA	
A	6.000A	1mA	$\pm(1.2\%+3)$
	20.00A	10mA	$\pm(1.5\%+5)$

* Available to continuously measure the current up to 10 A. When measuring the current of 10A~20A, it should not take more than 30 seconds, we suggest to wait for 15 minutes before measuring the low current continuously with the instrument after measuring the current of more than 10A.

Frequency response: 45~400 Hz (UT195E)

45~1 kHz (UT195M)

45~5 kHz (UT195DS)

Display true RMS.

Accuracy Guaranteed Range: range of 5~100%, short circuit is allowed to have remain readings less than 2 digits.

The AC wave peak factor is up to 3.0 in full value.

Non-sine waveform: Wave peak factor is 1.0 to 2.0, accuracy should be added 3.0% (UT195M/UT195DS is 1.0%).

Wave peak factor is 2.0 to 2.5, accuracy should be added 5.0% (UT195M/UT195DS is 2.5%).

Wave peak factor is 2.5 to 2.0, accuracy should be added 7.0% (UT195M/UT195DS is 4.0%).

⚠ Overload protection: (Overload protection for similar DC current measurement)

XI. Maintenance and Repair

Warning: Before opening the back cover of the instrument, ensure that the power supply has been turned off and probes have been removed from the input ports and the measured circuit.

1. General Maintenance and Repair

* Please use wet cloth and gentle cleaning agent to clean the case, do not use grinding agent or solvent.

* If any abnormality is found with the meter, stop using it and send it for repairing.

* If need to check or repair the meter, please ask for qualified special maintenance personnel or authorized maintenance department.

2. Batteries and Fuse Replacement

If LCD display show undervoltage or symbol, replace the built-in batteries immediately, otherwise the measurement accuracy will be influenced. Battery specification is 6F22 9V.