






- 6) In AC voltage mode, press down and hold SELECT button to enter and turn on MOTOR phase rotation measurement function (UT219M UT219DS), LCD displays flashing locked symbol “

Fix the black probe at L3, the red probe will first measure L1, wait till the “ symbol will be displayed on LCD, indicating forward rotation phase sequence.

Fix the black probe at L3, the red probe will first measure L2, wait till the “” on the LCD is locked, change the red probe to L1 within 5 seconds, in this case the  symbol will be displayed on LCD, indicating reverse phase sequence.

After completion of the measurement, short pressing SELECT button can restart the MOTOR measurement (only for UT219DS); pressing down and holding SELECT button for at least 2 seconds again will exit the MOTOR phase rotation measurement function.

⚠ Notes:

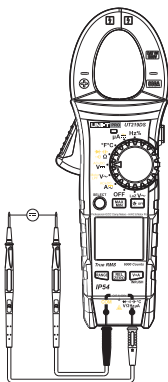
- 1) Phase sequence measuring condition, the frequency is 40 Hz ~ 80 Hz in case of AC 80V and more, the flashing “” symbol will display on LCD screen and it will keep on waiting if range of frequency response is exceeded.
- 2) A special filter circuit is built in the chip of UT219DS product, which will filtrate the high-frequency interference signal, and suitable to the measurement in case of variable-frequency voltage. The lock time for measured phase sequence (approximate 10s more or less).
- 3) When carrying out measurement by using UT219M product in variable frequency condition, due to the impact of multiple-harmonic PWM, the lock time for measured phase sequence is much slower (about 30s more or less), and the frequency range is just suitable from 50 Hz to 80 Hz, and it is possible that the unstable state of phase sequence measuring may occur.

⚠ Note:

- Do not input a voltage that is more than 600 Vrms. As there is the possibility to measure much higher voltage, but the risk to damage the instrument exists!

- In case of measuring high voltage, special attention should be paid to prevent the risk of electric shock!
- In low pass filter measurement mode, the instrument will automatically change to Manual mode, the range can be selected by pressing RANGE button.
- After completion of all measuring operation, disconnect the probes from the tested circuit.
- When the measured voltage is higher than 30V/AC safe voltage, the LCD of this instrument will display high voltage warning prompt “⚡”, in case of over-voltage input: when it is more than AC 600 V range, this instrument will automatically buzze intermittent sound and the high voltage warning prompt ⚡ will flash to prompt the warning!

4. Direct-voltage measurement.

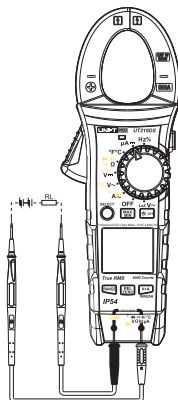


- 1) Insert the red probe into “V” socket; insert the black probe into “COM” socket.
- 2) Set the functional range switch to “ V_{DC} ” (UT219E) or “ V_{DC}^{auto} ” (UT219M) or “ V_{DC}^{DC} ” (UT219DS), pressing SELECT button selects the measuring range of AC voltage, and parallelly connect the probes to the power supply or load to be measured.
- 3) Read the DC Voltage value from the display.
- 4) Press “SELECT” button to select AC+DC function, the main display on the screen indicates AC+DC values; the secondary display will automatically switchover to indicate ACA value or DCA value with an interval of 2s (UT219DS).

⚠ Notes:

- Do not input a voltage that is more than 600 V. As there is the possibility to measure much higher voltage, but the risk to damage the instrument exists!
- In case of measuring high voltage, special attention should be paid to prevent the electric shock.
- After completion of all measuring operation, disconnect the probes from the tested circuit.
- When the measured voltage is higher than 30V/DC safe voltage, the LCD of this instrument will display high voltage warning prompt “⚡”, in case of over-voltage input: when it is more than DC 600 V range, this instrument will automatically buzze intermittent sound and the high voltage warning prompt ⚡ will flash to prompt the warning!

6. DC microamp current measurement (UT219M, UT219DS)

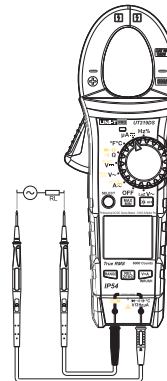


- 1) Insert the red probe into “ μA ” socket; insert the black probe into “COM” socket.
- 2) Set the functional range switch to “ μA ”, press SELECT button to select the measuring range of DC microampere current, and parallelly connect the probes to the power supply or load to be measured.
- 3) Read the DC microampere current value from the display.

⚠ Notes:

- Do not input DC or AC 30 V and more voltage to prevent from personal injury.
- After completion of all measuring operation, disconnect the probes from the tested circuit.

7. AC microampere current measurement (UT219M, UT219DS)

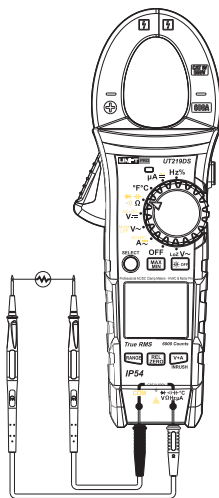


- 1) Insert the red probe into “ μA ” socket; insert the black probe into “COM” socket.
- 2) Set the functional range switch to “ μA ”, press SELECT button to select the measuring range of AC microampere current, and parallelly connect the probes to the power supply or load to be measured.
- 3) Read the true root mean square and frequency values of AC microampere current from the display (UT219DS).

⚠ Notes:

- Do not input DC or AC 30V and more voltage to prevent from personal injury.
- After completion of all measuring operation, disconnect the probes from the tested circuit.

8. Resistance measurement

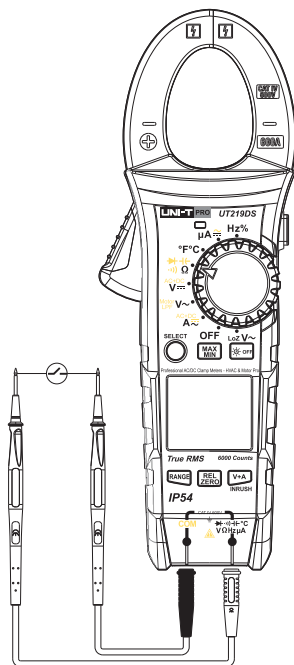


- 1) Insert the red probe into “Ω” socket; insert the black probe into “COM” socket.
- 2) Set the functional range switch to “Ω” (UT219E) or “Ω” (UT219M) or “Ω” (UT219DS), press SELECT button to select the measuring range of resistance, and parallelly connect the probes to both ends of the resistance to be measured.
- 3) Read the value of resistance to be measured directly from the display.

⚠ Notes:

- If the resistance to be measured is open circuit or the value of resistance is more than the maximum range of the instrument, the “OL” will be displayed.
- When measuring the on-line resistance, turn off all power supplies in the circuit to be measured and discharge all residual charges on all capacitors before carrying out measurement. In this way, the correct measuring can be assured.
- In case of low resistance measuring, there is an additional error of about 0.1 Ω to 0.2 Ω resistance. To obtain the precise reading, the relative measurement function can be used, first short circuit the input probes and press REL button, carry out low resistance measurement after the instrument has subject the indicated value when shorting circuit the probes.
- If the resistance value is not less than 0.5 Ω when shortening circuit of probes, check for any loosening or other causes with the probes.
- When measuring high resistance, the reading will become stable after time duration of few seconds. This is normal for high resistance measuring.
- Do not input DC or AC 30 V and more voltage to prevent from personal injury.
- After completion of all measuring operation, disconnect the probes from the tested circuit.

9. Conductivity testing



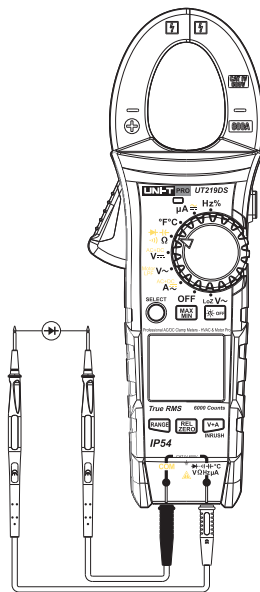
- 1) Insert the red probe into “1000” socket, insert the black probe into “COM” socket.

- 2) Set the functional range switch to “ \rightarrow ” (UT219E) or “ \rightarrow ” (UT219M) or “ \rightarrow ” (UT219DS), press SELECT button, and parallelly connect the probes to both ends of the load to be measured. If the resistance between both ends is less than 10Ω , the circuit is considered as breakover, the buzzer will sound continuously. In case the resistance is more than 50Ω , the buzzer will not give any sound.
- 3) Read the value of resistance value of load for the circuit to be measured directly from the display.

⚠ Notes:

- When inspecting the on-line circuit conductivity, turn off all power supplies in the circuit to be measured and discharge all residual charges on all capacitors before carrying out measurement.
- For circuit conductivity measuring, the open circuit voltage is about -3.2 V or more less, the range is 100Ω measurement.
- Do not input DC or AC 30 V and more voltage to prevent from personal injury.
- After completion of all measuring operation, disconnect the probes from the tested circuit.

10. Diode measuring

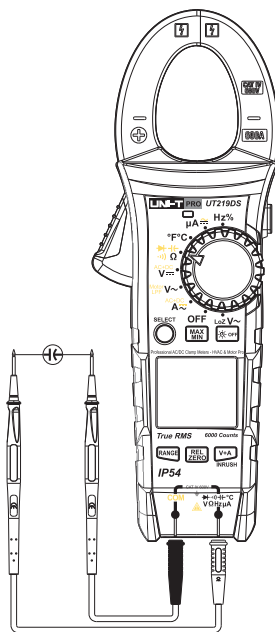


- 1) Insert the red probe into “ \rightarrow ” socket, insert the black probe into “COM” socket. The polarity of the red probe is “+”, the polarity of the black probe is “-”.
- 2) Set the function switch to “ \rightarrow ” (UT219E) or “ \rightarrow ” (UT219M) or “ \rightarrow ” (UT219DS) measurement position, press SELECT button to select diode measurement \rightarrow , read the positive PN-junction voltage of the diode to be measured directly from the display. For silicon PN-junction, it will be confirmed to be normal value if the reading is about 500 to 800 mV.

⚠ Notes:

- If the diode to be measured is open circuit or the polarity is reverse, “OL” will be displayed.
- When measuring the on-line diode, turn off all power supplies in the circuit to be measured and discharge all residual charges on all capacitors before carrying out measurement.
- The open circuit voltage of diode in UT219E is about 10 V more or less, voltage value for voltage stabilizing diode can be measured (less than 9 V). The open circuit voltage of diode in UT219M and UT219DS is 3.2 V more or less.
- Do not input DC or AC 30V and more voltage to prevent from personal injury.
- After completion of all measuring operation, disconnect the probes from the tested circuit.

11. Capacitance measurement

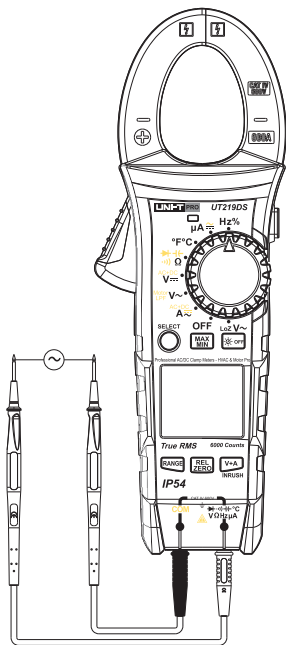


- 1) Insert the red probe into “ \ominus ” socket, insert the black probe into “COM” socket.
- 2) Set the range switch to “ \ominus ” (UT219E, UT219M) or “ $\Omega \rightarrow \ominus$ ” (UT219DS) measurement position, press SELECT button to select the measuring range of resistance, and parallelly connect the probes to both ends of the resistance to be measured.
- 3) Read the value of capacitance value of load for the circuit to be measured directly from the display.

⚠ Notes:

- If the capacitance to be measured is short circuit or the value of capacitance is more than the maximum range of the instrument, the “OL” will be displayed.
- In the capacitance measurement mode, the cursor of analog bar is deactivated. For the measurement of capacitance of more than 600 μF , it will take much longer time so as to generate correct reading.
- For the purpose of guaranteeing the measurement resolution, it is suggested to fully discharge the residual charges before measuring, then connect with the instrument for measurement, this is much more important for high voltage capacitance to prevent the instrument from being damaged and personal injury.
- After completion of measuring operation, disconnect the probes from the tested capacitance.

12. Frequency/duty ratio measurement

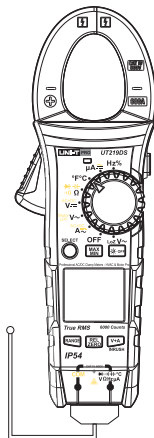


- 1) Insert the red probe into “Hz” socket; insert the black probe into “COM” socket.
- 2) Set the functional range switch to “Hz” (UT219M) or “Hz%” (UT219E, UT219DS) measurement position, parallelly connect the probes to the signal source to be measured.
- 3) Read the value of frequency and duty ratio (UT219DS) to be measured directly from the display. In case of UT219E, press “Hz%” button once to enter Duty Ratio measurement mode, press “Hz%” button again to enter frequency measurement mode.

⚠ Note:

- The requirement for input amplitude (a) should be met in frequency measurement:
 - ≤100 kHz: $200 \text{ mVrms} \leq a \leq 20 \text{ Vrms}$
 - > 100 kHz~1 MHz: $600 \text{ mVrms} \leq a \leq 20 \text{ Vrms}$
 - > 1 MHz~10 MHz: $1 \text{ Vrms} \leq a \leq 20 \text{ Vrms}$
 - > 10 Mhz: $1.8 \text{ Vrms} \leq a \leq 20 \text{ Vrms}$
- Following requirements should be satisfied in duty ratio measurement:
 - The waveform is square wave, and frequency $\leq 10 \text{ kHz}$
 - the amplitude: $2 \text{ Vpp} \leq \text{Input amplitude} \leq 20 \text{ Vpp}$
- Do not input 30 Vrms and more voltage for the frequency to be measured to prevent from personal injury.
- After completion of all measuring operation, disconnect the probes from the tested circuit.

13. Temperature measurement (UT219M, UT219DS)



- 1) Set the range switch to “°C/°F” position, in this case the LCD displays “OL”, and display room temperature by shorting circuit the probes.
- 2) Insert the type K temperature plug into the socket position as shown in the picture.
- 3) Use the temperature probe to detect the surface to be measured, the measured Celsius value and Fahrenheit value can be read directly from the LCD (UT219DS), in case of UT219M, it becomes necessary to press SELECT button to display Fahrenheit.

⚠ Notes:

- The ambient temperature for the instrument should not exceed a range of 18 to 28°C, otherwise measuring error will be caused, which becomes much more significant when measuring in low temperature environment.
- Do not input DC or AC 30 V and more voltage to prevent from personal injury.
- After completion of all measuring operation, remove the temperature probe.

12. Other functions

- Auto-Shutoff function:


If any knob switch is not operated or any button is not pushed within about 15 minutes, the instrument will turn on the auto-shutoff function to save energy. In the auto power off state, click any button or turn the knob switch, the instrument will be waken up automatically.

The auto-shutoff feature will be canceled when powering on again after pressing SELECT button in shutdown state. It will be necessary to restart the unit to restore the Auto-off function.

- 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.

- Low voltage testing: Detect the internal VDD while the power is supplied, when it is less than 3 V, “” low battery symbol will be displayed.

XIII. Technical specifications

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

Ambient temperature: 23°C to 5°C (73.4°F \pm 9°F)

Relative humidity: $\leq 75\%$

⚠ Note:

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

1. AC current

Range	Resolution	Accuracy		Overload protection
		40Hz~100Hz	100Hz~400Hz	
60.00A	0.01A	$\pm(1.8\%+6)$	$\pm(3.5\%+6)$	600A
600.0A	0.1A			

- Display: True root mean square: Suitable to a range of 5% to 100%.
- Frequency response: 40 Hz~400 Hz, frequency measurement is suitable to a range of 10% to 100%.
- The AC wave peak factor is up to 3.0 in full value, the accuracy of non-sine wave should be adjusted based on following conditions:
Wave peak factor 1.0 to 2.0 The accuracy should be increased by 3.0%
Wave peak factor 2.0 to 2.5 The accuracy should be increased by 5.0%
Wave peak factor 2.5 to 3.0 The accuracy should be increased by 7.0%
- The accuracy of inrush current is 10%, this is just for reference

2. DC current (UT219DS)

Range	Resolution	Accuracy	Overload protection
60.00A	0.01A	$\pm(1.8\%+6)$	600A
600.0A	0.1A		

- Press ZERO key for resetting the background figure

3. AC+DC current (UT219DS)

Range	Resolution	Accuracy		Overload protection
		40Hz~100Hz	100Hz~400Hz	
60.00A	0.01A	$\pm(3.0\%+6)$	$\pm(4.5\%+6)$	600A
600.0A	0.1A			

- The AC current is true root mean square, and suitable to a range of 5% to 100%.
- AC frequency response: 40 Hz~400 Hz,
- The AC wave peak factor is up to 3.0 in full value, the accuracy of non-sine wave should be adjusted based on following conditions:
Wave peak factor 1.0 to 2.0 The accuracy should be increased by 3.0%
Wave peak factor 2.0 to 2.5 The accuracy should be increased by 5.0%
Wave peak factor 2.5 to 3.0 The accuracy should be increased by 7.0%
- Press ZERO key for resetting the background figure of DC current
- AC+DC (AC is combined with DC) is defined as $\sqrt{a_{ac}^2 + d_{dc}^2}$

4. AC voltage

Range	Resolution	Accuracy	Overload protection
6.000V	0.001V	± (1.0%+6)	600V DC 600V AC
60.00V	0.01V		
600.0V	0.1V		

- Input impedance: the input impedance is about 10 M Ω .
- Display true root mean square, suitable to a range of 5% to 100%.
- Frequency response: 40 Hz~400 Hz (UT219E UT219M), 40Hz~1kHz (UT219DS), the frequency measurement is suitable to a range of 10% to 100%.
- The AC wave peak factor is up to 3.0 in full value (except 600 V range, 1.5 in case of this full range value) for non-sine waveform, the accuracy of non-sine wave should be adjusted based on following conditions:
Wave peak factor 1.0 to 2.0 The accuracy should be increased by 3.0%
Wave peak factor 2.0 to 2.5 The accuracy should be increased by 5.0%
Wave peak factor 2.5 to 3.0 The accuracy should be increased by 7.0%

5. Motor AC voltage (UT219M UT219DS)

Range	Resolution	Accuracy	Overload protection
600.0V	0.1V	± (2.0%+7)	600V DC 600V AC

- Input impedance: the input impedance is about 10 M Ω .
- Under the condition of variable frequency power supply, the measured voltage value is only for reference!
- Display true root mean square, suitable to a range of 5% to 100%.
- AC frequency response: 40Hz~80Hz
- The AC wave peak factor is up to 3.0 in full value (except 600 V range, 1.5 in case of this full range value) for non sine waveform, the accuracy of non sine wave should be adjusted based on following conditions:
Wave peak factor 1.0 to 2.0 The accuracy should be increased by 3.0%
Wave peak factor 2.0 to 2.5 The accuracy should be increased by 5.0%
Wave peak factor 2.5 to 3.0 The accuracy should be increased by 7.0%

6. LoZ AC voltage

Range	Resolution	Accuracy	Overload protection
600.0V	0.1V	± (2.5%+6)	600V DC 600V AC

- Input impedance: the input impedance is about 300 k Ω .
- Display true root mean square, suitable to a range of 5% to 100%.
- Frequency response: 40Hz~400Hz (UT219E), 40Hz~1kHz (UT219DS), the frequency measurement is suitable to a range of 10% to 100%.

- The AC wave peak factor is up to 1.5 in full value, the accuracy of non-sine wave should be adjusted based on following conditions:
Wave peak factor 1.0 to 2.0 The accuracy should be increased by 3.0%
Wave peak factor 2.0 to 2.5 The accuracy should be increased by 5.0%
Wave peak factor 2.5 to 3.0 The accuracy should be increased by 7.0%
- The measuring time should not exceed 1 minute

7. DC voltage

Range	Resolution	Accuracy	Overload protection
600.0mV (UT219E)	0.1mV	± (0.8%+3)	600V DC 600V AC
6.000V	0.001V	± (0.6%+3)	
60.00V	0.01V	± (0.9%+6)	
600.0V	0.1V		

- Input impedance: the input impedance is about 10 MΩ

8. AC+DC voltage (UT219DS)

Range	Resolution	Accuracy	Overload protection
6.000V	0.001V	± (2.0%+5)	600V DC 600V AC
60.00V	0.01V		
600.0V	0.1V		

- Input impedance: the input impedance is about 10MΩ.
- Display true root mean square of AC voltage, suitable to a range of 5% to 100%.
- AC frequency response: 40 Hz~400 Hz
- The AC wave peak factor is up to 3.0 in full value (except 600 V range, 1.5 in case of this full range value) for non sine waveform, the accuracy of non sine wave should be adjusted based on following conditions:
Wave peak factor 1.0 to 2.0 The accuracy should be increased by 3.0%
Wave peak factor 2.0 to 2.5 The accuracy should be increased by 5.0%
Wave peak factor 2.5 to 3.0 The accuracy should be increased by 7.0%
- AC+DC (AC is combined with DC) is defined as

$$\sqrt{ac^2+dc^2}$$

9. Resistance measurement

Range	Resolution	Accuracy	Overload protection
60.00Ω (UT219M)	0.01Ω	± (1.5%+3)	600V DC 600V AC
600.0Ω	0.1Ω	± (1.3%+3)	
6.000kΩ	1Ω	± (1.0%+3)	
60.00kΩ	10Ω		
600.0kΩ	100Ω		
6.000MΩ	1kΩ	± (1.6%+4)	
60.00MΩ	10kΩ	± (2.6%+7)	

10. Conductivity test (••)

Range	Resolution	Accuracy	Overload protection
600.0Ω (UT219E)	0.1Ω (UT219E)	The buzzer will give a sound in case of less than 50 Ω, and will not give a sound in case of more than 50 Ω	600V DC 600V AC
60.00 (UT219M)	0.01Ω (UT219M)		
99.99Ω (UT219DS)	0.01Ω (UT219DS)	Open-circuit voltage is about 3 V	

11. Diode measuring (▶)

Range	Resolution	Accuracy	Overload protection
6.000V (UT219M)	0.001V	Open-circuit voltage for UT219E is about 10 V, the voltage value for voltage stabilizing diode can be measured (less than 9 V), the open circuit voltage of diode in UT219M or UT219DS is 3.2V more or less, which can measure the PN junction with the positive voltage drop of 3 V and less. The normal voltage value for Silicon PN junction is about 0.5 to 0.8 V.	600V DC 600V AC
6.000V (UT219DS)			
6.000V/ 10.00V (UT219E)			

12. Capacitance measurement

Range	Resolution	Accuracy	Overload protection
6.000nF (UT219M)	0.001nF	± (4.0%+30) UT219E ± (4.0%+7) UT219M	600V DC 600V AC
60.00nF	0.01nF	± (4.0%+7) UT219DS	
600.0nF	0.1nF	± (4.0%+7)	
6.000uF	0.001uF		
60.00uF	0.01uF		
600.0uF	0.1uF		
6.000mF	0.001mF	± 10%	
60.00mF	0.01mF		

In case of capacitance to be measured $\leq 1\mu\text{F}$, it is suggested that the accuracy of measurement can be guaranteed only by using the REL measurement mode.

13. Frequency

Range	Resolution	Accuracy	Overload protection
60.00Hz~10.00MHz (UT219E)	0.01Hz~ 0.01MHz	± (0.1%+6)	600V DC 600V AC
60.00Hz~40.00MHz (UT219M)			
60.00Hz~40.00MHz (UT219DS)			

The requirement for input amplitude (a) should be met in frequency measurement:

- $\leq 100\text{ kHz}$: $200\text{ mVrms} \leq a \leq 30\text{ Vrms}$
- $> 100\text{ kHz} \sim 1\text{ MHz}$: $600\text{ mVrms} \leq a \leq 30\text{ Vrms}$
- $> 1\text{ MHz} \sim 10\text{ MHz}$: $1\text{ Vrms} \leq a \leq 30\text{ Vrms}$
- $> 10\text{ MHz}$: $1.8\text{ Vrms} \leq a \leq 30\text{ Vrms}$

14. Duty ratio measurement (UT219E UT219DS)

Range	Resolution	Accuracy	Overload protection
0.1%~99.9%	0.1%	$\pm (2.6\%+7)$	600V DC 600V AC

Following requirements should be satisfied in duty ratio measurement:

The waveform is square wave, and frequency $\leq 10\text{kHz}$

the amplitude: $2\text{Vpp} \leq \text{Input amplitude} \leq 30\text{Vpp}$

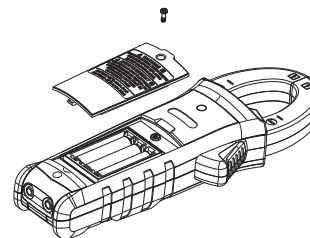
Frequency $\leq 1\text{kHz}$, Duty: 5.0%-95.0%

Frequency $> 1\text{kHz}$, Duty: 30.0%-70.0%

15. Temperature measurement (UT219M, UT219DS)

Range		Resolution	Accuracy	Overload protection
°C	-40~1000°C	-40~0°C	$\pm 5^\circ\text{C}$	600V DC 600V AC
		> 0~600°C	$\pm (2.0\%+5^\circ\text{C})$	
		> 600~1000°C	$\pm (2.5\%+5^\circ\text{C})$	
°F	-40~1832°F	-40~32°F	$\pm 9^\circ\text{F}$	
		> 32~1112°F	$\pm (2.0\%+9^\circ\text{F})$	
		> 1112~1832°F	$\pm (2.5\%+9^\circ\text{F})$	

Remarks: The point K type (nickel-chromium ~ nickel-silicon) thermocouple provided for the accessories is only suitable to the measurement of 230°C/446°F and less temperature.

XIV. Maintenance and Repair

⚠ Warning: Remove the test probes before opening the bottom cover in order to prevent from electric shock.

1. General maintenance

a. The repair and service of this clamp meter should be carried out by qualified professional maintenance staff or authorized repair department.

b. Clean the case regularly with dry cloth, but it is not allowed to use the cleaning agent containing lapping compound or solvent component.

2. Installation or replacement of batteries

The power supply for this product is 3 type AAA 1.5V batteries, please install or replace the batteries by following order:

a. Shut down this product, remove the test probes at input end.

b. With panel of this product facing down, unscrew the battery box screws and pull out the cover, take out the batteries, install the new batteries according to the indication of the polarities.

c. Please use the batteries of the same type, do not install any improper batteries.

d. After installing new batteries, put back the battery cover and fix it with screws.

The contents of this manual are subject to change without notice.

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