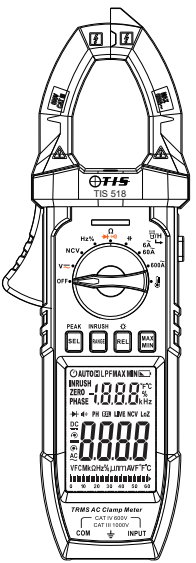
TIS 518

True RMS 600A AC Clamp Meter



USER MANUAL

PREFACE

Thank you for purchasing the TIS 518 AC clamp meter. In order to use the clamp meter safely and correctly, please read this manual thoroughly, especially the Safety Instruction sections.

After reading the manual, it is recommended to keep it either with the instrument or somewhere you can easily access it, for future reference during operation.

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1. INTRODUCTION

The TIS 518 is a 6000 count auto range and manual range integrated true RMS AC clamp meter, the overall circuit design is based around a large-scale integrated circuit Σ/Δ analog-to-digital converter, with full range overload protection circuit, also featuring a 36.5x50.5mm large LCD display to show clear readings.

The TIS 518 can be used to measure AC/DC voltage, peak voltage, VFC, AC current, inrush current, resistance, capacitance, frequency, duty cycle, diode, continuity, NCV, live wire, temperature, as well as other parameters such as data hold, MAX/MIN measurement, relative mode, LCD backlight, flashlight, low-voltage indication, and auto power off.

To fully utilise this clamp meter, please keep this manual for reference in a safe place.

⚠ WARNING

Before operation, please carefully pay attention to the “SAFETY OPERATION GUIDELINES” .

2. ACCESSORIES

Open the packaging box and remove the clamp meter, please check if the following accessories are missing or damaged.

1) User manual.....1pc
2) Test leads.....1pair
3) K-type thermocouple.....1pc
4) Carrying bag.....1pc
5) Battery.....1.5V (AAA) x 3pcs

If any of the above accessories are missing or damaged, please contact your local distributor for assistance.

3. SAFETY OPERATION GUIDELINES

Please pay attention to the “Warning Signs and Warning Descriptions”. Warning indicates the situation or action that may cause the danger to the user or damage the meter.

The TIS 518 is designed and manufactured according to IEC61010-1, IEC61010-2-032 and IEC61010-2-033 safety standards, and confirmed to CAT III 1000V, CAT IV 600V, double insulation, and pollution degree 2. Please use this instrument in accordance with the instructions to maintain these standards.

Before operation, please check whether any item is damaged or behaving abnormally. If any abnormal item (such as bared test leads, damaged housing case, broken LCD, etc) is found, or if the meter itself is considered to be malfunctioning, please do not continue to use the instrument.

1)Do not use the meter if the rear case or the battery compartment is not properly covered, otherwise there is a risk of electric shock.

2)During the operation of the meter, keep fingers behind the finger guards on the test leads, and do not touch the exposed wires, connectors, unused input jacks, or circuits being measured to prevent electric shock.

3)Set the rotary switch to the correct position before measurement to prevent damage to the meter.

4)Do not apply voltage over DC1000V/AC1000V between any meter terminal and earth ground to prevent electric shock or damage to the meter.

5)Take great care when making measurements if the voltages are greater 42VDC or 30VAC RMS, these voltages are considered a shock hazard.

6)Never input voltage or current which exceeds the specified limit, if the range of the measured value is unknown, the max.range should be selected.

7)Before measuring resistance, diode and continuity, switch off the power supply of the circuit, and fully discharge all capacitors to avoid inaccurate measurements.

8)When the “ ▭ “ symbol appears on the LCD, please replace the batteries immediately to ensure measurement accuracy. If the meter is not due to be used for a long time, please remove the batteries.
9)Do not tamper with the internal circuit of the clamp meter to avoid damaging it and exposing danger to the user.
10)Do not use or store the meter in high temperatures, high humidity, flammable, explosive or strong magnetic field environments.
11)Clean the housing case with a soft cloth and mild detergent. Do not use abrasives or solvents.

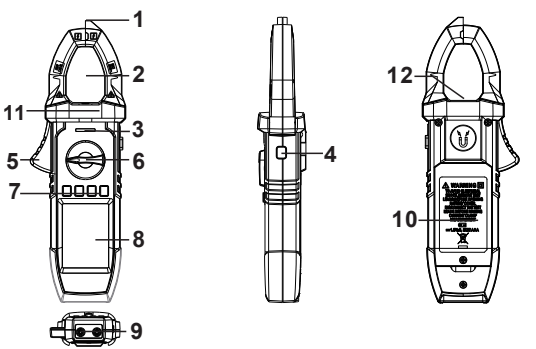
4. ELECTRICAL SYMBOLES

Please pay attention to the “Warning Signs and Warning Descriptions”. Warning indicates the situation or action that may cause the danger to user or damage the meter.

	Equipment protected by double or reinforced insulation
	Diode
	Earth (Ground)
	Capacitance
	Warning or Caution
	AC (Alternating Current)
LoZ	Low impedance AC/DC voltage automatic measurement.
	DC (Direct Current)
	Rick of electric shock
	AC or DC
	Complies with European Union standards
	Temperature

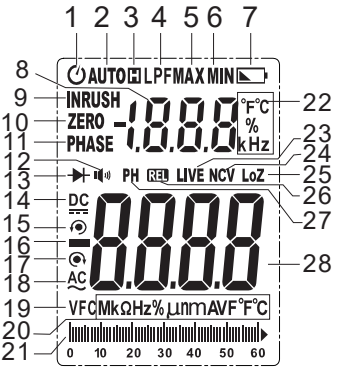
	Conforms to UL & CSA Standards 61010-1, 60101-2-032, 61010-3-033
	Continuity buzzer
CAT III 1000V CAT IV 600V	It is applicable to testing and measuring circuits connected to distribution part of building's low-voltage MAINS installation.

5. THE METER DESCRIPTION



1)NCV indication position
2)Clamp jaws: for measuring AC current, which converts current into voltage
3)LED indicator: once applied NCV with flashing warning light
4)Side push button: for flash light and data hold function
5)Clamp opening trigger: press to open clamp jaws; release the trigger, the clamp jaws will be closed
6)Rotary switch: for selection measuring function
7)Function buttons: for selection the basic functions
8)LCD display: displays measurement value and functional symbols
9)Input jacks: input of measuring signal
10)Battery compartment
11)Hand guard: to protect users' hands from touching hazardous areas
12)Flash light

6. LCD FULL DISPLAY DESCRIPTION



01	Automatic power off	02	Auto range
03	Data hold	04	Low pass filter measurement
05	Maximum value measurement	06	Minimum value measurement
07	Low battery voltage	08	Secondary display area
09	Inrush current measurement	10	Adjust to zero
11	Phase	12	Continuity test
13	Diode test	14	DC signal
15	Phase reversal	16	Negative
17	Phase corotation	18	AC signal
19	VFC measurement	20	Major display unit symbols
21	Analog bar	22	Secondary display unit symbols

23	Live wire recognition	24	NCV detection
25	Loz AC/DC	26	Relative measurement
27	Peak value	28	Major display area

7. RANGES AND FUNCTIONAL BUTTONS DESCRIPTION

1) Range Selection

Functional Range	Description
OFF	Power off
V≂	AC/DC voltage measurement
NCV LIVE	NCV detection, Live wire recognition
Hz%	Frequency, duty cycle measurement
Ω •ıı)) ⊣	Diode, continuity, resistance measurement
⊣⊢	Capacitance measurement
A～	AC current measurement
	Fahrenheit and Celsius measurement

2) Functional buttons

Note: When pressing the correct button linked to the function, there will be an audible sound, if pressed whilst on the incorrect function setting there will be no sound.
Short press: press the button for less than 2 seconds
Long press: press the button for more than 2 seconds

button

Short press: button once to activate data hold mode, press button again to exit data hold mode.
Long press: button once to turn on the flashlight and LCD backlight, long press button again to turn off the flashlight and LCD backlight.

SEL PEAK button

Short press: **SEL PEAK** to select between functions for each rotary switch position.
Long press: under AC voltage mode and press **SEL PEAK** to activate peak measurement, long press **SEL PEAK** again to activate peak hold mode.

INRUSH / RANGE button

Short press: under voltage, resistance, current modes short press **INRUSH / RANGE** button to activate manual range mode, and then, short press **INRUSH / RANGE** button once to jump up one range, when it reaching the highest range, short press **INRUSH / RANGE** button again to jump back the lowest measurement mode.
Long press: under AC current mode and long press **INRUSH / RANGE** button to activate “INRUSH” measurement, long press **INRUSH / RANGE** button again to exit “INRUSH” measurement.

REL button

Short press: **REL** button to turn on LCD backlight, long press **REL** button again to turn off the LCD backlight.
Long press: **REL** button to activate relative measurement mode, long press **REL** button again to exit relative measurement mode.
NOTE: under capacitance mode, long press **REL** button to clear the base.

MAX MIN button

Short press: **MAX MIN** button, the LCD displays “MAX” symbol and enters maximum value measurement mode, and short press **MAX MIN**

button, the LCD displays “MIN” symbol and enters minimum value measurement mode.
NOTE: under MAX/MIN mode, the auto power off function is disabled.

Long press: under “MIN” measurement mode and long press **MAX MIN** button to exit MAX/MIN measurement.
NOTE: MAX/MIN mode is not available among the measurements of Hz/%, ⊣⊢, ⊣◀ / 🔊, NCV/LIVE.

8. TECHNICAL SPECIFICATIONS

8.1 General Specification

Max display	6000 counts
Size of LCD display	36.5 x 52.2mm
Polarity display	Auto
Overload display	“OL” or “-OL”
Low battery indication	“ ” is displayed
Sampling rate	3 times/s
Sensor type	Coil induction
Test position error	If the source under test is not placed at the centre of the clamp jaws when measuring current, ±1.0% additional error in reading maybe generated
Max.Jaw opening	φ34mm
Jaws internal size	44.3(L) x 29.3(W)mm
Max.measured conductor size	φ30.0mm (copper bar: 12.5x44.5mm)

Power supply	3 x 1.5V AAA batteries
Auto power off	15 minutes (can be disabled)
Dimension	215 x 75 x 40mm
Weight (include batteries)	about 289g

8.2 Environmental Specification

Operating altitude	2000m
Safety standards	IEC61010-1; IEC61010-2-032; IEC61010-2-033 CAT III 1000V, CAT IV 600V
Pollution degree	2
Opertating temp./ humidity	0℃~30℃ (≤80%RH); 30℃~40℃ (≤75%RH); 40℃~50℃ (≤45%RH)
Storage temp./ humidity	-10℃~60℃ (≤80%RH)
Electromagnetic compatibility	when RF=1V/m; overall accuracy = specified accuracy+5% of range When RF>1Vm; not specified

8.3 Electrical specification

Accuracy	±(% of reading +digits), 12months calibration cycle
Ambient temperature	23℃±5℃
Ambient humidity	≤80%RH

⚠NOTE:

To ensure measurement accuracy, the operating temperature should be within 18℃~28℃ and the fluctuation range should be within ±1℃. When the temperature is <18℃ or >28℃, add temperature coefficient error 0.1x (specified accuracy) / ℃

(1) AC current (A～)

Range	Resolution	Accuracy	Overload Protection
6.000A	0.001A	±(2.5%+5)	600A
60.00A	0.01A	±(2.5%+5)	
600.0A	0.1A	±(2.5%+5)	

AC current (A～)

• Display: True RMS
• Accuracy is 5% to 100% of range; if the DC current does not return to zero and there is a base number, press REL to clear the base during measurement.
• AC current frequency response: 40Hz~400Hz
• when the measured current is over 500A, the continuous measurement time can not exceed 60s.
• The AC crest factor will reach 3.0 at 3000 counts while only reach ≤1.5 at 6000 counts. The additional error should be added according to the crest factor of a non-sinusoidal wave are.
a)Add 4% when crest factor is 1~2
b)Add 5% when crest factor is 2~2.5
c)Add 7% when crest factor is 2.5-3
• For AC current frequency monitoring, the resolution is 0.001Hz and accuracy is ±(0.001~ 3)
For AC current frequency monitoring, the resolution is 0.001Hz and accuracy is ±(0.001~ 3), the input amplitude should be ≥ 20% of range

(2) Inrush Current (**INRUSH**)

Range	Resolution	Accuracy	Overload Protection
60A	0.01A	±(10%+10)	600A
600A	1A	±(10%+10)	

• The maximum TRMS current value within an integration period of approx. 100ms.

(3) AC/DC Voltage (V≂)

Range	Resolution	DCV	ACV	Overload Protection
600mV	0.1mV	±(0.8%+3)	—	1000V DC/AC
6.000V	0.001V	±(0.5%+5)	±(1.0%+3)	
60.00V	0.01V			
600.0V	0.1V			
1000V	1V	±(0.8%+5)	±(1.0%+5)	

• Display: True RMS
• Accuracy is 5% to 100% of range; short circuit allows least significant digit ≤5.
• Input impedance≥10MΩ
• Frequency response: 40~1000Hz
• The AC crest factor will reach 3.0 at 3000 counts and will only reach ≤ 1.5 at 6000 counts. The additional errors should be added according to the crest factor of a non-sinusoidal wave:
a)add 4% when crest factor is 1~2
b)add 5% when crest factor is 2~2.5
c)Add 7% when crest factor is 2.5-3
• For AC current frequency monitoring, the resolution is 0.001Hz and accuracy is ±(0.001~ 3), the input amplitude should be ≥ 10% of range
• Monitoring online frequency under AC current measuring mode, the resolution is at 0.001Hz, accuracy is at ± (0.001 - 3)
• The input amplitude must meet the requirement of ≥ range x10%

(4) Resistance (Ω)

Range	Resolution	Accuracy	Overload Protection
600.00Ω	0.1Ω	±(1.0%+3)	600V DC/AC
6.000kΩ	0.001kΩ	±(1.0%+2)	
60.00kΩ	0.01kΩ		
600.0kΩ	0.1kΩ		
6.000MΩ	0.001MΩ	±(2.0%+8)	
60.00MΩ	0.01MΩ		

• Measurement result = displayed value - resistance of shorted test leads
• Open circuit voltage: about 1V
• Accuracy: 5% ~ 100% of range

(5) Continuity ( )

Range	Resolution	Accuracy	Overload Protection
600.0Ω	0.1Ω	Open circuit: resistance >50Ω, no beep; well-connected circuit: resistance<50Ω, consecutive beep.	600V DC/AC

• Resistance value is between 50Ω ±5Ω. the buzzer will sound.
• Open circuit voltage: approx. 1V.

(6) Diode ( )

Range	Resolution	Accuracy	Overload Protection
6.000V	0.001V	Open circuit voltage: approx. 3V, measurable PN junction: forward voltage drop ≤3V, for silicon PN junction, the normal value is generally approx. 0.5~0.8V.	600V DC/AC

(7) Capacitance (⊣⊢)

Range	Resolution	Accuracy	Overload Protection
60.00nF	0.01nF	±(4.0%+25)	600V DC/AC
600.0nF	0.1nF		
6.000uF	0.001uF	±(4.0%+5)	
60.00uF	0.01uF		
600.0uF	0.1uF		
6.000mF	0.001mF		
60.00mF	0.01mF	±(10.0%+9)	
100.0mF	0.1mF		

• Measurement result = displayed value - capacitance of shorted test leads
• For capacitance ≤1μF, it is recommended to use “REL” measurement mode
• Accuracy: 5% ~ 100% of range

(8) Temperature (℃/℉)

Range	Resolution	Accuracy	Overload Protection
-20℃~0℃	1℃	±4	600V DC/AC
0℃~400℃		±(2%+3)	
400℃~1000℃		±(3%+3d)	
-4°F~50°F	1°F	±5	
50°F~750°F		±(2%+5)	
750°F~1832°F		±(3%+5)	

• K-type thermocouple is applicable
• If the ambient temperature of the meter differs by ±5℃, the accuracy can be only be guaranteed after 1 hour of cool down time.
• Open circuit display: “OL”

(9) Frequency / Duty Cycle (Hz%)

Range	Resolution	Accuracy	Overload Protection
10Hz~10 MHz	0.001Hz~1KHz	±(0.1%+3)	600V DC/AC
10.0%~90.0%	0.1%	±(2.6%+7)	

- Frequency input amplitude:
  10Hz~100kHz: 50mVrms ≤ input amplitude ≤20Vrms;
  100kHz~10MHz: 1Vrms ≤ input amplitude ≤20Vrms
- Duty cycle: 10% ~ 90%: for square waves of 10Hz ~ 1kHz;
  30% ~ 70%: for square waves of 1kHz ~ 10MHz.
  Input amplitude: 2Vpp ≤ input amplitude ≤ 20Vpp

(10) Non-Contact Voltage (NCV) Detection

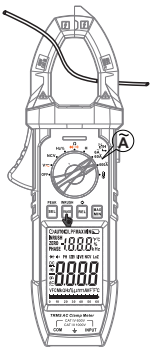
Range	Accuracy	Overload Protection
NCV	Approach the NCV sensor close to a wire to start sensing, when no voltage is detected, the LCD displays “EF”. As the intensity of the detected voltage is increased, more segments “--“ will be displayed, and the flashing red light changes from slow to fast and the buzzer sounds from slow to fast.	1000V DC/AC

(11) Live Wire Recognition (LIVE)

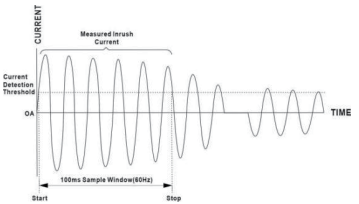
Range	Accuracy	Overload Protection
LIVE	When the tip of test leads contacts the wire for detection, if there is no voltage detected, the LCD displays “LIUE”, if voltage is detected, the LCD displays ”__”, the flashing red LED lights up and the buzzer sounds.	1000V DC/AC

9. OPERATING INSTRUCTIONS

9.1 AC Current Measurement



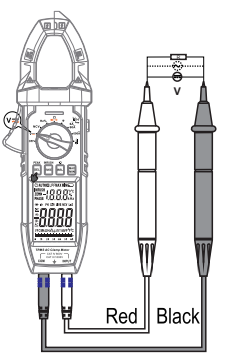
1)Set the rotary switch to **A~** position, short press **SEL PEAK** button to shift to AC measuring mode. Press the trigger to open the clamp jaws and fully enclose one conductor, then release the trigger until the clamp jaws are completely closed. For optimum testing results, make sure the conductor is in the centre of the clamp jaws. Only one conductor can be measured at one time, if two or more conductors are measured simultaneously, the measurement reading will be incorrect.
2)The True RMS AC current is shown in the LCD display, simultaneously along with the frequency value.
3)In AC current mode, long press **SEL PEAK** button and long press **RAN INRUSH** button to activate inrush current measurement mode to measure the instantaneous starting current of an electrical device. Long press **RAN INRUSH** button again to exit inrush current measurement mode.
The Inrush current function captures the starting current precisely within a 100 millisecond period when the device starts, as shown below.



⚠NOTE:

• The current measurement function must be operated between 0℃~40℃. To ensure accurate readings, the conductor under test must be placed in the centre of the clamp jaws, otherwise an additional reading error of ±1.0% will result.

9.2 AC Voltage and Peak Voltage Measurement

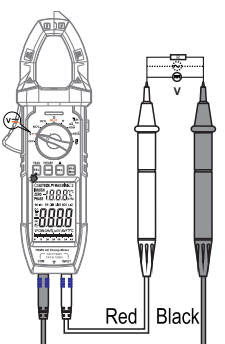


1)Insert the red test lead into **INPUT** jack, and insert the black test lead into **COM** jack.
2)Set the rotary switch to **VFC V≂** position.
3)Short press **SEL PEAK** button to shift AC voltage measurement mode, and connect the test leads with the measurement load or power supply in parallel.
4)Read the value of true RMS AC voltage and frequency from LCD display.
5)Short press **RAN INRUSH** button to shift to manual range mode, cycling follows in order as 6V/60V/600V/1000V/AUTO.
6)Long press **SEL PEAK** button to activate **MAX PEAK, MIN PEAK** measuring mode, read the AC voltage PEAK value from the LCD display.

⚠NOTE:

• Do not attempt to take any voltage measurement that might exceed AV 1000V RMS in order to prevent
damage to the meter.
• When measuring high voltage, be very careful to avoid electric shock.
• After the measurements are completed, disconnect the test leads from the circuit under test.

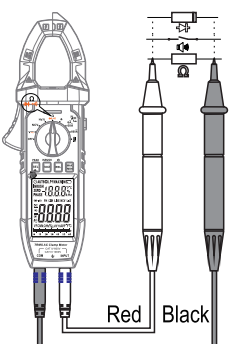
9.3 DC Voltage Measurement



1)Insert the red test lead into **INPUT** jack, and insert the black test lead into **COM** jack.
2)Set the rotary switch to **VFC V≂** position.
3)Short press SEL button to shift DC voltage measurement mode, and connect the test leads with the measurement load or power supply in parallel.
4)Read measured voltage value from LCD display.
The MAX/MIN measuring function can be enabled in DC voltage measuring mode.

⚠NOTE:
• Do not attempt to take any voltage measurement that might exceed 1000V in order to prevent damage to the meter.
• When measuring in the 600mV range, use relative mode to achieve accurate values. Short-circuit the test leads and press REL button, the instrument will subtract the short-circuit value of the test leads automatically, and read the measured voltage value again.
• When measuring high voltage, be very carefully to avoid electric shock.
• After measurements are completed, disconnect the test leads from the circuit under test.

9.4 Resistance Measurement

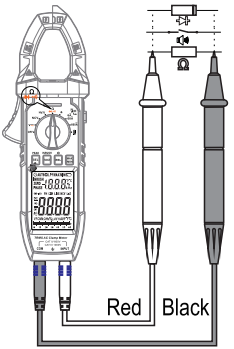


1)Insert the red test lead into **INPUT** jack, and insert the black test lead into **COM** jack.
2)Set the rotary switch to position, press **SEL** button to select resistance measurement, and connect the test leads with the measurement resistance in parallel.
3)Read the resistance value from LCD display.

⚠ NOTE:

• If the measured resistance is open or exceeds the max. range, the LCD will display “OL”
• Before measuring the resistance online, switch off the power supply of the circuit, and fully discharge all capacitors to ensure accurate measurement.
• When measuring low resistance, the test leads will generate 0.1Ω~0.2Ω error, use “REL” mode to obtain accurate readings. Short-circuit the test leads, and then short press REL button, the meter automatically subtracts the resistance of the short-circuited test leads and the low-resistance measurement can be performed.
• If the resistance is not less than 0.5Ω when test leads are short-circuited, please check the test leads for abnormalities.
• When measuring resistance above 1MΩ, it is normal to take a few seconds to stabilise reading.
• Do not attempt to input 42V DC or 30V AC rms to avoid danger to the user.
• After completing the measurements, disconnect the test leads from the circuit under test.

9.5 Continuity Check

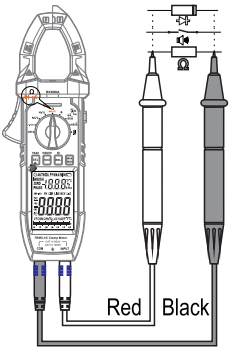


1)Insert the red test lead into **INPUT** jack, and insert the black test lead into **COM** jack.
2)Set the rotary switch to Ω position, press **SEL** button to select continuity test mode, and connect the test leads with both ends of measured load in parallel.
3)When the measured resistance is ≤50Ω, it means that the circuit is in a good conduction status and the buzzer will beep continuously; when resistance is ≥50Ω, there will be no buzzer sound.
4)Read the resistance value of the circuit under test from the LCD display.

⚠NOTE:

• Before measuring continuity, switch off the power supply of the circuit, and fully discharge all capacitors.
• For circuit continuity test, the open circuit voltage is around 1V, and range is 600Ω.
• Do not attempt to input 42V DC or 30V AC rms to avoid danger to the user.
• After completing the measurements, disconnect the test leads from the circuit under test.

9.6 Diode Test

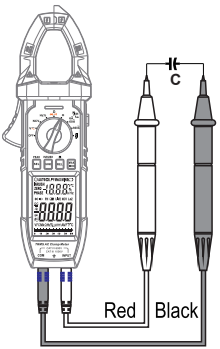


1)Insert the red test lead into **INPUT** jack, and insert the black test lead into **COM** jack. The polarity of the red test lead is "+" and that of the black test lead is "_".
2)Set the rotary switch to position, press **SEL** button to select diode test mode
3)Connect the red test lead with the diode anode, and the black test lead with diode cathode.
4)Read the approximate forward voltage of the diode on the display. For silicon PN junction, the normal value is generally approx. 500 ~ 800mV.

⚠ NOTE:

• If the diode is open or its' polarity is reversed, the LCD will display "OL".
• Before measuring the diode online, switch off the power supply of the circuit, and fully discharge all capacitors to ensure accurate measurement.
• The open circuit voltage of the diode test is approx. 3V.
• Do not attempt to input 42V DC or 30V AC rms to avoid danger to the user.
• After completing the measurements, disconnect the test leads from the circuit under test.

9.7 Capacitance Measurement

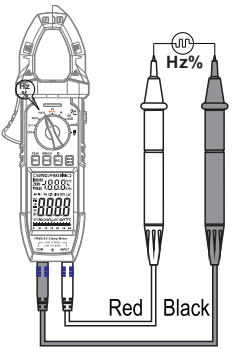


1)Insert the red test lead into **INPUT** jack, and insert the black test lead into **COM** jack.
2)Set the rotary switch to ⊣⊢ position, and connect the test leads with both ends of the measured capacitance in parallel.
3)Read the capacitance value of the circuit under test on the LCD display. It is recommended to use the short line input for capacitance measurement to reduce the impact of distributed capacitance.
4)When capacitance ≤1μF, it is recommended to use REL mode to subtract the readings of the open circuit.

⚠NOTE:

• If the measured capacitance is short-circuited or the capacitance exceeds the max.range, the LCD will display “OL”.
• When measuring capacitance >600μF, it may take some time to stabilise the readings.
• Before taking capacitance measurements, fully discharge all capacitors (especially on high-voltage capacitors) to avoid damage the meter or to endanger the user.
• After completing the measurements, disconnect the test leads from the circuit under test.

9.8 Frequency, Duty Cycle Measurement

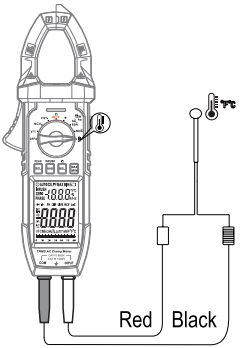


1)Insert the red test lead into **INPUT** jack, and insert the black test lead into **COM** jack.
2)Set the rotary switch to Hz% position, and connect the test leads with both ends of the measured signal source in parallel.
3)Short press **SEL** button to change between frequency measurement or duty cycle measurement.
4)Read the frequency value or duty cycle value of the circuit under test on LCD display.

⚠NOTE:

- When measuring frequency, it must conform to the input amplitude:
  Frequency ≤100kHz: 50mVrms ≤ a ≤20Vrms
  Frequency 100kHz ~10MHz: 100mVrms ≤ a ≤20Vrms
- Duty cycle:
  10% ~ 90%: for square waves of 1Hz ~ 1kHz;
  30% ~ 70%: for square waves of 1kHz ~ 10MHz.
  Input amplitude: 2Vpp ≤ input amplitude ≤ 20Vpp
- Do not input voltage higher than 30Vrms to avoid personal injury.
- After completing the measurements, disconnect the test leads from the circuit under test.

9.9 Temperature Measurement

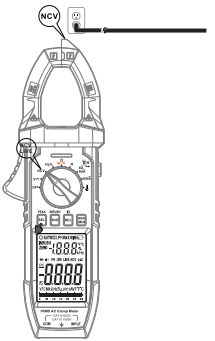


1)Set the rotary switch to **°C °F** position, and the LCD will display ambient temperature.
2)Insert the K-type thermocouple into the jacks as above.
3)Use the temperature sensor to measure the object surface, and read the Celsius temperature value on the LCD after a few seconds.
Short press SEL button to switch to Fahrenheit temperature measurement.

⚠NOTE:

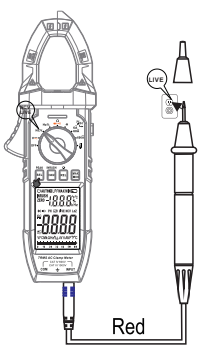
• The ambient temperature of the meter should be in the range of 18~28°C, otherwise it may cause measurement error, especially in low temperature environments.
• Do not attempt to input 42V DC or 30V AC rms to avoid personal injury.
• After completing the measurements, remove the thermocouple.

9.10 Non-Contact Voltage (NCV) Detection



1)Set the rotary switch to NCV LIVE position and press **SEL** to select NCV mode, move the NCV sensor close to the wire under test for AC voltage detection.
2)If there is AC voltage or electromagnetic field present, the LCD will display the sensing intensity from weak to strong by "-" "--" "---" "----" 4 grades, at the same time, the buzzer will beep intermittently and the LED indicator will light up.
If there is no voltage detected, the LCD displays "EF".

9.11 Live Wire Recognition (LIVE)



1)Insert the red test lead into **INPUT** jack.
2)Set the rotary switch to **NCV LIVE** position and press **SEL** to select LIVE mode.
2)Connect the test lead to the signal source under test, the LCD will display the sensing intensity from weak to strong by "-" "--" "---" "----" 4 grades, at the same time, the buzzer will beep intermittently and the LED indicator will light up. If no voltage is detected, the LCD displays "LIVE"

⚠NOTE:

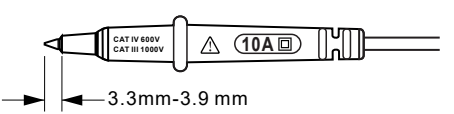
• Do not input voltage higher than 300V, it may have the risk of damaging the meter.
• When measuring, be careful to avoid electric shock.

9.12 Auto Power Off Function

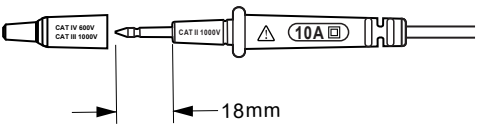
During measurement, if there is no operation of the rotary switch or any button for 15 minutes, the meter will be automatically powered off to save power. The user can 'wake' the instrument up by pressing any button (except the flashlight button). To disable this function, press and hold the SEL button in the off state and turn on the meter.

9.13 Use of Test Leads

1) Testing in CAT III / CAT IV measurement locations:
Ensure the test lead shields are pressed firmly in place. Failure to use the CAT III / CAT IV shields increases arc-flash risk.



2)Testing in CAT II measurement locations:
CAT III/CAT IV shields may be removed for CAT II locations. This will allow testing on recessed conductors, such as standard wall outlets. Take care not to lose the shields.

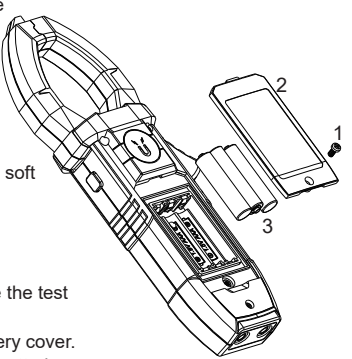


10. MAINTENANCE

⚠ WARNING:

Before opening the bottom case of the meter, remove the test leads to avoid electric shock.

1) General Maintenance
- The maintenance and service must be implemented by qualified professionals.
- Clean the housing case with a soft and mild detergent. Do not use abrasives or solvents.



2)Battery Replacement
- Turn off the meter and remove the test leads from the input jacks.
- Unscrew and remove the battery cover.
- Replace with 3 standard AAA batteries according to the polarity indication.
- Secure the battery cover and tighten the screw.

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