

# UNI-T®



## UT220

### Operating Manual



2000A Digital Clamp Meters



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## I. Overview

Ut220 is a safe and reliable 3 1/2 bit AC digital clamp ammeter with stable performance (hereinafter referred to as clamp meter). The overall unit circuit is designed with large-scale integrated circuit dual integral A/D converter as the core, provides full-range overload protection circuit. The clamp meter with unique appearance design has been the specific electro-technical instrument with superior performance. It is used for measuring AC and DC voltage, AC current, resistance, diode and circuit on-off.

The instruction manual includes relevant safety information and warning indication, please read them carefully and strictly observes all warnings and notes.

### Warning:

Prior to using clamp meter, please read the relevant "Safety operation guidelines" carefully.

## II. Open-case inspection

Unpack and take out the instrument, please check carefully if the following attachments are complete or intact.

1. An operating instruction manual
2. A test pen
3. Wrist strip
4. A bag


In case of shortage or damage, please contact with your supplier.

## III. Safety operation guidelines












Please not the "warning signs and words" Warning means the condition or action that may cause threat to user or damage to the instrument or equipment to be measured.

The clamp ammeter is designed and produced strictly in accordance with GB4793 safety requirements, IEC/EN 61010-1, IEC/EN61010-2-032, IEC/EN61010-2-033 Over-Voltage CAT III 1000V, CATIV600V, Double Insulation and Pollution Degree 2 standards. The supplied test leads together with the clamp meter live up to EN61010-031 CATIII 1000V, CATIV 600V and Double Insulation requirements. Use the Meter as specified in the manual; otherwise the protection provided by the Meter may be impaired.

1. Check the clamp ammeter and test pen before using, guard against any damage or abnormal phenomenon. If any abnormal condition were found: bare test pen, damaged chassis insulation, no display in LCD, or the clamp meter is thought not be able to work normally, please do not use it.
2. It is forbidden to use the clamp ammeter prior to having rear cap and battery cover in place, or otherwise there will be electric shocking.
3. Keep finger within the scope of test pen finger protection position, and do not contact the bare wire and connector, unused input terminal or the circuit being measured when clamp ammeter is in operation.
4. Function switches shall be set at the correct position prior to measurement. It is forbidden to perform gear conversion in measurement to guard against damage to the meter.
5. Refrain from applying between the clamp ammeter terminals and ground the voltage over DC1000V /AC750V to guard against electric shocking and clamp meter damage.
6. Be careful in measuring RMS voltage higher than DC 70V or AC 33V, since there will be electric shocking.

7. Do not measure the voltage or current higher than the allowable input value. Set the function range switch at the maximum range position if the scope of measured value couldn't be defined. Prior to measurement of on-line resistance and diode or the circuit on-off measurement, the power of circuits being measured shall be powered off and all capacitors shall be completely discharged to assure the measurement accuracy.
8. When LCD display shows the icon “” it is required to replace the battery in time to ensure the measurement accuracy. Take out battery when clamp meter is not in user for a long time.
9. Refrain from changing the internal wiring in the clamp ammeter to guard against damage to the meter and danger.
10. Refrain from storing or using the clamp ammeter in the explosive and flammable environment with high temperature, high humidity and strong electromagnetic field.
11. Clean the clamp meter case with soft cloth and neutral detergent. To prevent causing corrosion to the case, or damage to the instrument and danger, it is forbidden to use abrasive material and solvent.

#### IV. Electrical symbols

	Dual insulation		Diode
	Grounding		Low battery
	Warning prompt		AC or DC (Alternating current or direct current)
	AC (Alternating current)		Danger! High voltage!
	DC (Direct current)		Comply with EU standard
	Buzzing on-off		
CAT IV	Equipment is designed to protect against transients from the primary supply level (e.g. an electricity meter, primary overcurrent protection devices).		
CAT III	Equipment is designed to protect against transients in equipment in fixed installations (e.g. switches in fixed installation, industrial used equipments with permanent connection to fixed installations).		

#### V. External construction (See Figure 1)

1. **Clamp body:** Safety design to protect operator from touching the dangerous area
2. **Clamp head pulling handle:** Press the trigger to open the clamp head, when release the trigger, clamp head will partially closed.
3. **Functional key:** Select basic functions
4. **Measure input terminal:** Measure the signal input
5. **LCD display area:** Display the measured data and functional symbols.
6. **Dial switch:** Select the measurement function gear.
7. **Clamp head:** A sensing device used to measure AC/DC current and covert current into voltage.

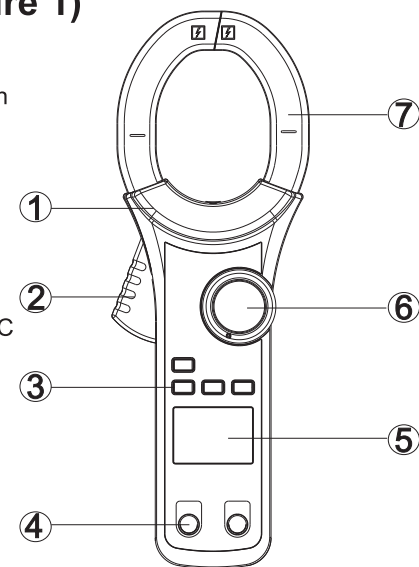


Figure 1



## VI. Display symbols (See Figure 2)

1. Low battery indicator;
2. DC signal measurement indicator;
3. Negative polarity indicator;
4. AC signal measurement indicator;
5. Measured value display;
6. Resistance measurement unit ( $\Omega$ ,  $k\Omega$ ,  $M\Omega$ );
7. Voltage measurement unit (V, mV)
8. Current measurement unit (A);
9. Conduction measurement indicator;
10. Diode testing indicator;
11. Data hold indicator;
12. Auto range indicator;
13. Maximum value measurement indicator;

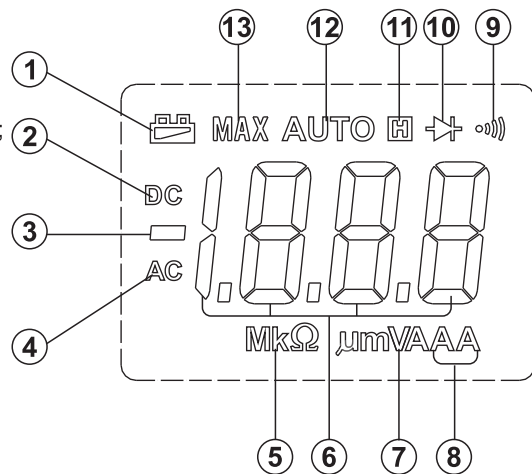


Figure 2

## VII. Key function and buzzer

### SELECT : Function selection key.

Actuated by trigger method, used for switching among the measurement functions at the gear  $\Omega$ ,  $\rightarrow$ ,  $\rightarrow$ .

### MAX : Maximum value hold key

Actuated by trigger method; after pressing the key, A/D will continue working, and displayed value will be constantly updated and maximum value is held (the actual value is not the peak value but maximum one).

### $\odot$ : Backlight key

Actuated by trigger method; backlight will be illuminated when pressing the key over 2S; after another press over 2S, it will be turned off.

### HOLD : Reading hold key

Actuated by trigger method, used for holding display. After pressing the key, the displayed value is locked and held, after another press, lock is released and it returns to normal measurement status.

### Validity of keys:


Not all the key operations at a gear are valid. The corresponding operation function can be selected or instrument under sleep state be awakened only by valid key operations, as shown below:

	$\odot$	SELECT	MAX	HOLD
2000 $\bar{A}$	✓	✗	✓	✓
200 $\bar{A}$	✓	✗	✓	✓
$\bar{V}$	✓	✗	✓	✓
$\bar{V}$	✓	✗	✓	✓
$\Omega$	✓	✓	✗	✓
$\rightarrow$	✓	✓	✗	✓
$\rightarrow$	✓	✓	✗	✓

**Buzzer:**

When pressing any function key at any measurement gear, if valid, buzzer will beep or remain silent; when measuring AC voltage > 750V/DC voltage > 1000V, buzzer will make sound as out-range alarm.

**VIII. Technical indicator****1. General specification**

Liquid crystal display:-----maximum display 2000;  
 Polarity display:-----auto positive and negative polarity display  
 Overload display:-----“OL” or “-OL”  
 Low voltage display:-----“” indicates that batter voltage is lower than working voltage, reminding replacing battery.  
 Sampling rate:-----about 3/s;  
 Type of sensor:-----AC measurement current coil sensor;  
 Test position error:-----an additional reading error of  $\pm 1.0\%$  may be resulted when the power to be measured is not clamped at the center of clamp head;  
 Impact resistance strength: -----1m fall impact;  
 Maximum openness of clamp head: -----diameter 63mm  
 Maximum dimension of current conductor to be measured:----- diameter 60mm  
 Electromagnetic field impact:-----the application of device near electromagnetic field may result in unstable display or inaccurate reading.  
 Power:-----6LF22 9V alkaline battery  
 Dimension: -----298mm  $\times$  107mm  $\times$  47mm;  
 Weight:-----about 389g (inclusive of battery);

**2. Environmental constraint:**

Working height:-----indoor  
 Maximum height:-----2000m  
 Safety codes:-----IEC61010-1;IEC61010-2-032; CAT III 1000V CAT IV600V ;  
 Pollution grade :-----2;  
 Operating humidity and temperature:---0°C ~ 30°C(not bigger than 80%RH), 30°C ~ 40°C (not bigger than 75%RH), 40°C ~ 50°C(not bigger than 45%RH)  
 Storage humidity and temperature:----- -20°C ~ +60°C (not bigger than 80%RH)

**3. Electrical specification**

Accuracy:-----  $\pm$  (%+ word number), one-year calibration time  
 Ambient temperature:-----23°C  $\pm$  5°C;  
 Ambient humidity: -----  $\leq 80\%$  RH  
 Temperature coefficient:----- 0.1  $\times$  (accuracy) /°C

**(1) DC voltage ( $\bar{V}$ )**

Range	Resolution	Accuracy	Overload protection
2.000V	0.001V	$\pm(0.8\%+3)$	1000V DC/AC
20.00V	0.01V	$\pm(0.8\%+1)$	
200.0V	0.1V		
1000V	1V	$\pm(1.0\%+3)$	

Input impedance  $\geq 10M\Omega$

**(2) AC voltage (  $\tilde{v}$  )**

Range	Resolution	Accuracy	Overload protection
2.000V	0.001V	$\pm(1.2\%+5)$	1000V DC/AC
20.00V	0.01V		
200.0V	0.1V		
750V	1V	$\pm(1.5\%+5)$	

Mean value response

Input impedance  $\geq 10M\Omega$

Frequency response: 40 ~ 400Hz( $\leq 400mV$ ; 50 ~ 100Hz)

**(3) Resistance (  $\Omega$  )**

Range	Resolution	Accuracy	Overload protection
200.0 $\Omega$	0.1 $\Omega$	$\pm(1.2\%+2)$	1000V DC/AC
2.000k $\Omega$	0.001k $\Omega$	$\pm(1.0\%+2)$	
20.00k $\Omega$	0.01k $\Omega$		
200.0k $\Omega$	0.1k $\Omega$		
2.000M $\Omega$	0.001M $\Omega$	$\pm(1.2\%+2)$	
20.00M $\Omega$	0.01M $\Omega$	$\pm(1.5\%+2)$	

**(4) Continuity test (  $\cdot \text{||}$  )**

Range	Resolution	Accuracy	Overload protection
$\cdot \text{  }$	0.1 $\Omega$	Buzzer will make sound when $\leq 10\Omega$	1000V DC/AC
		Open-circuit voltage is about 0.4V	

**(5) Diode test (  $\rightarrow \text{+}$  )**

Range	Resolution	Accuracy	Overload protection
$\rightarrow \text{+}$	0.001V	0.5V ~ 0.8V	1000V DC/AC
		Open-circuit voltage is about 1.5V	

**(6) AC current (  $\tilde{A}$  )**

Range	Resolution	Accuracy	Overload protection
200.0A	0.1A	$\pm(2.5\%+5)$	2500A
2000A	1A		

Mean value response

Frequency response: 50Hz ~ 60Hz

## IX. Instruction for measurement operation

### 1. DC voltage measurement $\bar{v}$ (See Figure 3)

#### (1) Insert test pen

Insert black test pen in COM and red test pen in “V” input terminal, prepare for measurement.

#### (2) Set $\bar{v}$ function gear

By turning knob to start instrument and allowing pointer toward “ $\bar{v}$ ”, clamp meter enters the DC voltage measurement function gear;

#### (3) Connect the voltage to be measured

Place the red and black test pen at both ends of the voltage to be measured, clamp meter will automatically select the proper range, and LCD displays the currently measured DC voltage value; if the potential at the red test pen is higher than the potential at the black test pen, screen displays the positive voltage value, or otherwise the negative voltage value;

#### Warning:

DC voltage measurement range exceeds DC1000V;

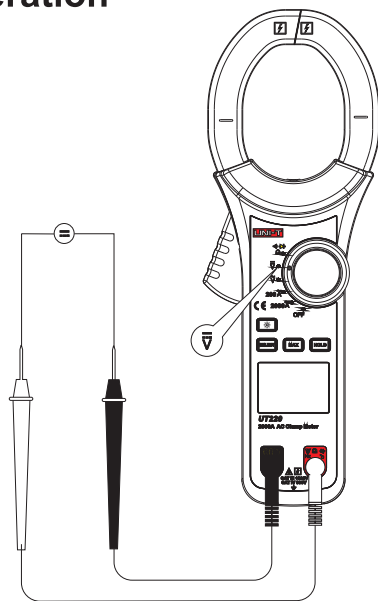


Figure 3

### 2. AC voltage measurement $\tilde{v}$ (See Figure 4)

#### (1) Insert test pen

Insert black test pen in COM and red test pen in “V” input terminal, prepare for measurement.

#### (2) Set $\tilde{v}$ function gear

By turning knob to start instrument and allowing pointer toward  $\tilde{v}$ , clamp meter enters the AC voltage measurement function gear;

#### (3) Connect the voltage to be measured

Place the red and black test pen at both ends of the voltage to be measured, then clamp meter will automatically select the proper range, and screen displays the current measured AC voltage value (mean value response);

#### Warning:

AC voltage measurement range should not exceed AC750V;

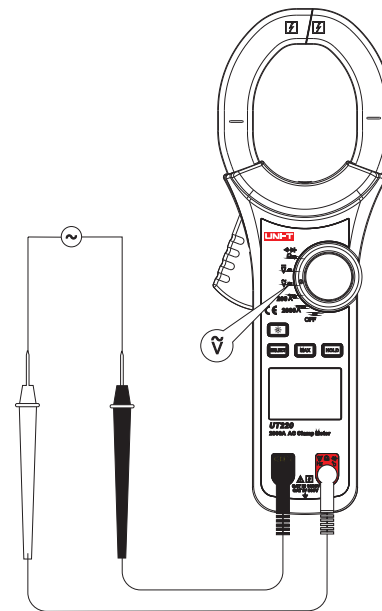


Figure 4

### 3. Resistance measurement $\Omega$ (See Figure 5)

#### (1) Insert test pen

Insert black test pen in COM and red test pen in “ $\Omega$ ” input terminal, prepare for measurement.

#### (2) Set $\Omega$ function gear

By turning knob to start instrument, allow the pointer toward  $\Omega$ , clamp meter enters the resistance measurement function gear;

#### (3) Selection of measurement function

It is not required to select “ $\Omega$ ” gear, the default setting status by pressing SELECT.

#### (4) Connect the resistance to be measured

Place the red and black test pen at both ends of the voltage to be measured, clamp meter will automatically select the proper range, and screen main display shows the currently measured resistance value;

#### ⚠ Warning:

When measuring on-line resistance, the circuit power should be powered off and all capacitors should be completely discharged prior to connecting to resistor. More accurate measurement result will be achieved by separating the component from circuit.

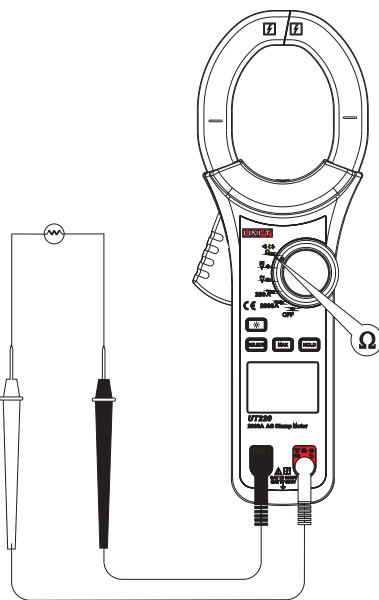


Figure 5

### 4. Diode measurement $\rightarrow$ (See Figure 6)

#### (1) Insert test pen

Insert black test pen in COM and red test pen in “ $\rightarrow$ ” input terminal, prepare for measurement.

#### (2) Set $\Omega$ function gear

By turning knob to start instrument, allow the pointer toward  $\Omega$ , clamp meter enters the resistance measurement function gear;

#### (3) Selection of measurement function

$\Omega$  gear is the default setting status, switch to  $\rightarrow$  gear by pressing SELECT;

#### (4) Connect the diode to be measured

Place the red and black test pen at positive and negative terminals of diode, screen main display will show the forward conduction voltage value of measured diode. When red and black test pen is inversely connected, screen will display over-range symbol “OL”.

#### ⚠ Warning:

When measuring on-line resistance, the circuit power should be powered off and all capacitors should be completely discharged prior to connecting to resistor. More accurate measurement result will be achieved by separating the component from circuit.

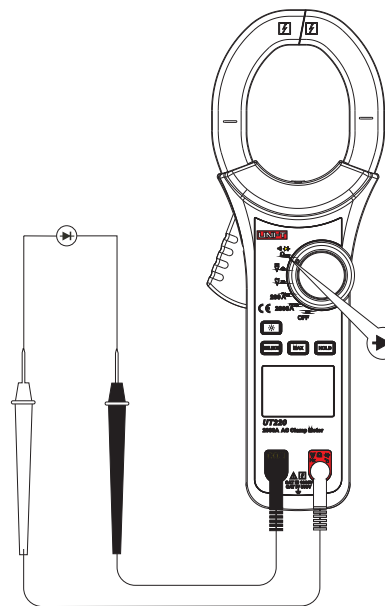


Figure 6

## 5. Conduction detection (·) (See Figure 7)

### (1) Insert test pen

Insert black test pen in COM and red test pen in “·” input terminal, prepare for measurement.

### (2) Set the $\Omega$ function gear

By turning knob to start instrument, allow the pointer toward  $\Omega$ , clamp meter enters the resistance measurement function gear;

### (3) Selection of measurement function

$\Omega$  gear is the default setting status, switch to “·” gear by pressing SELECT;

### (4) Connect to the terminal to be measured

Place the red and black test pen at two terminals to be measured, buzzer will make long sounds when measured resistance is less than  $10\ \Omega$ , make sounds or remain silent when measured values range from  $10\ \Omega$  to  $100\ \Omega$ , and remain silent when bigger than  $100\ \Omega$ .

### ⚠ When

measuring on-off, the circuit power should be powered off and all capacitors should be completed discharged prior to connecting to measured terminal.

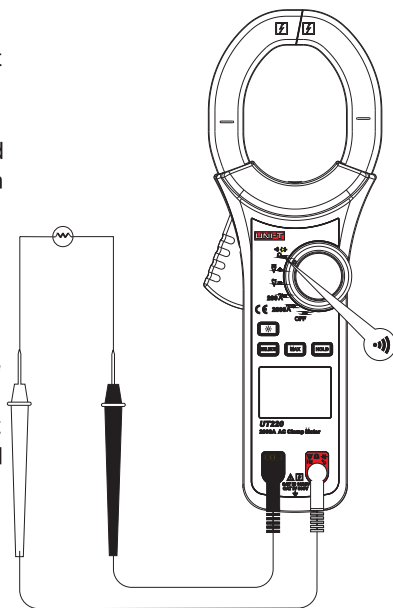


Figure 7

## 6. 2000A AC current measurement (2000 $\tilde{A}$ ) (See Figure 8)

### (1) Set “2000 $\tilde{A}$ ” function gear

By turning knob to start instrument, allow pointer toward 2000 $\tilde{A}$ , clamp meter enters the 2000A range AC current measurement function gear;

### (2) Clamping the current signal to be measured

Open the clamp meter head, clamp the current lead to be measured and keep it at the center position of clamp head, then close it. Clamp meter will display the measured value of the current to be measured (mean value response) as per the 2000A range;

⚠ The maximum measured current should not exceed AC2000A when measuring AC current.

Do not measure signal with frequency higher than the specified rating.

Do not attempt to measure large current continuously for a long time, for it may cause over-heating to magnetic circuits and then affect measurement accuracy.

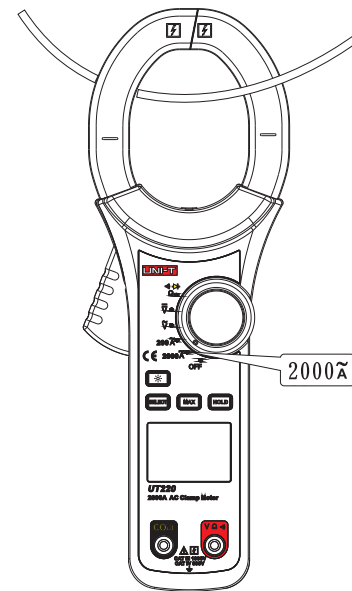


Figure 8


## 7. 200A AC current measurement (200 $\tilde{A}$ ) (See Figure 9)

### (1) Set "200 $\tilde{A}$ " function gear

By turning knob to start instrument, allow pointer toward 200  $\tilde{A}$ , clamp meter enters the 200A range AC current measurement function gear;

### (2) Clamping the current signal to be measured

Open the clamp meter head, clamp the current lead to be measured and keep it at the center position of clamp head, then close it. Clamp meter will display the measured value of the current to be measured (mean value response) as per the 200A range;

 The maximum measured current should not exceed AC2000A when measuring AC current.

Do not measure signal with frequency higher than the specified rating.

Do not attempt to measure large current continuously for a long time, for it may cause over-heating to magnetic circuits and then affect measurement accuracy.

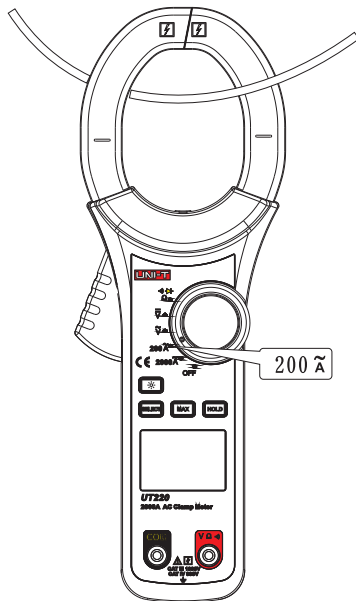


Figure 9

## X. Maintenance and upkeep (See Figure 10)

### Warning:

it is required to keep the test pen away prior to opening the base cap.

#### 1. General maintenance

- The clamp meter should be maintained and serviced by qualified professional serviceman or designated maintenance department.
- Clean the outer case with cloth, it is forbidden to clean with cleaning agent containing abrasive material or solvent.

#### 2. Installation or replacement of battery

The 6LF22 9V battery will provide power for the clamp ammeter. Please install or replace battery as follows:

- Shut down the clamp meter, move away the test pen located at the input terminal.
- Put the panel facing down, screw out the battery box screws, take off battery cap and take out battery, install new battery as per the indication of polarity.
- It is required to install the batteries of the same model. Do not install the improper battery.
- After installing new battery, load the battery cap and screw on screws.

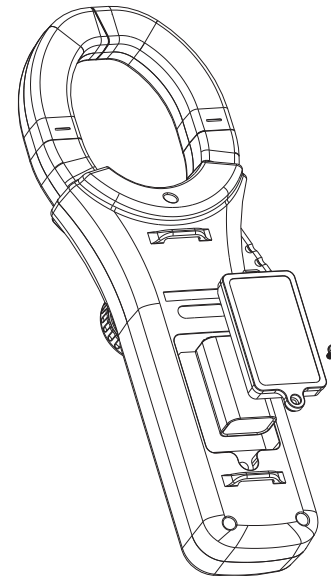


Figure 10



This manual is allowed to be alternated without prior notice.

## UNI-T®

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