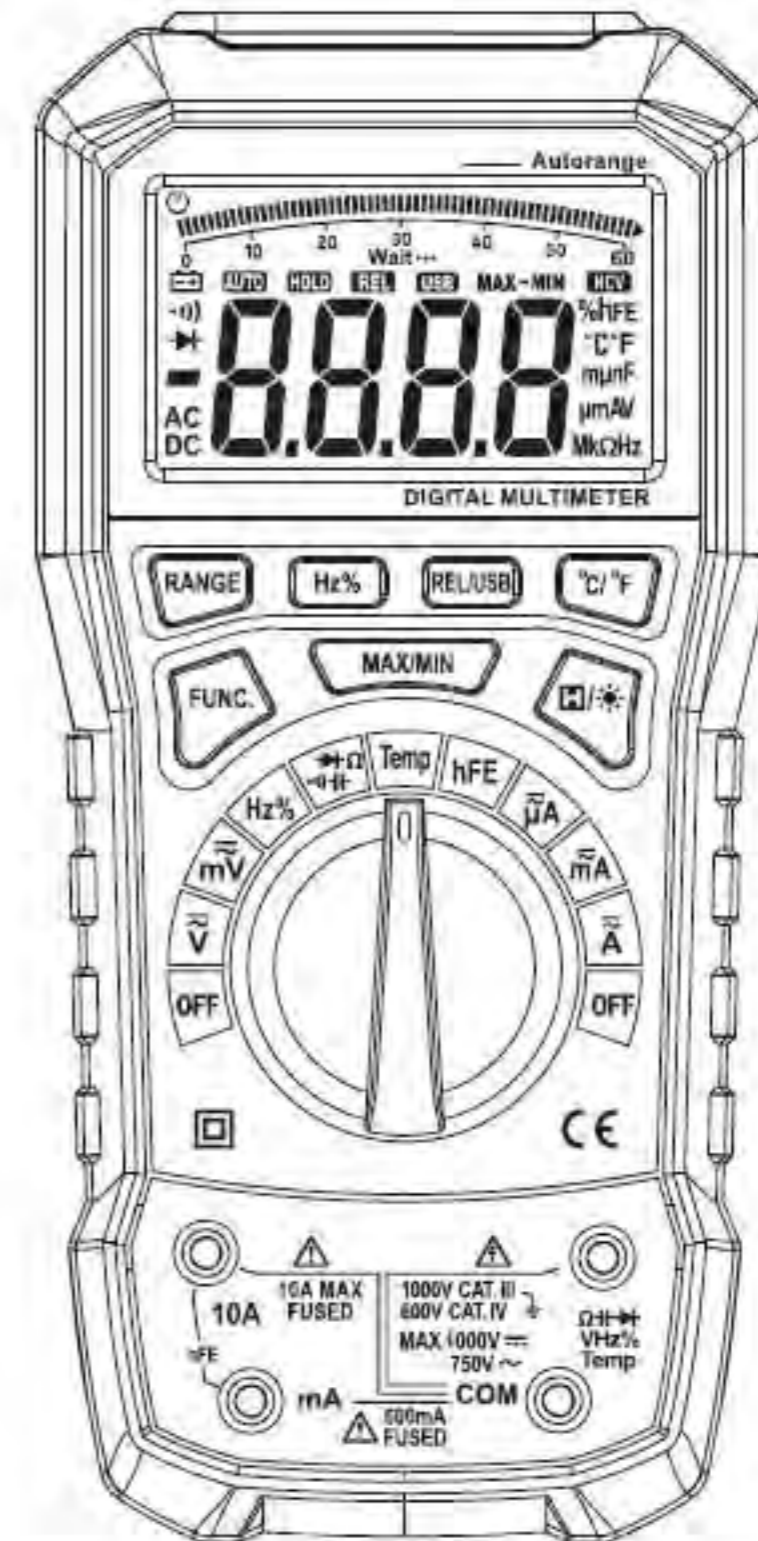


## Digital Multimeter With T-RMS/USB

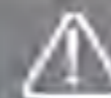


EMC&LVD

Designed and Conforms to  
IEC61010-1  
CAT.III 1000V



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IEC61010-1  
CAT.III 1000V



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## 1. The Statement

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### 1.1 Safety Statement

#### Caution



“Caution” mark refers to the condition and operation which may cause damage to the instrument or equipment.

It requires that you must be careful during the execution of the operation. If incorrectly perform the operation or do not follow the procedure, it may damage the instrument or equipment. In the circumstances that such conditions are not met or not fully understood, please do not continue to perform any operation indicated by the caution mark.

#### Warning



“Warning” mark indicates the condition and operation which may cause danger to users.

It requires that you must pay attention during the execution of this operation. If incorrectly perform the operation or do not follow the procedure, it may result in personal injury or casualties. In the circumstances that such conditions are not met or not fully understood, please do not continue to perform any operation indicated by the warning mark.

Before using the instrument, please read this manual carefully and pay attention to the relevant safety warning information.

## 1.2 Safety Instructions

The instrument is designed in accordance with the safety requirements on electronic measurement instruments in International Electrical Safety Standards IEC61010. The instrument is designed and manufactured strictly in accordance with provisions in IEC61010-1 CAT.III/1000V, over-voltage safety standard CAT.IV/600V and pollution level 2.












### 1.3 Safety Operation Specifications

**Warning: In order to avoid possible electric shock or personal injury and other safety accidents, please abide by the following specifications:**

- ⇒ Before using the instrument, please read this manual carefully, and pay attention to the safety warning information.
- ⇒ Check whether there are any cracks or damage on the plastic parts of the outer cabinet before using the instrument, if any, please do not use it.
- ⇒ Before using the instrument, please check whether the instrument works properly, if it' s not or it has been damaged, please do not use.
- ⇒ Before using the instrument, please carefully check the insulator around the input terminals of the instrument, please do not use if any damage.
- ⇒ Before using the instrument, please check whether there' s any crack or damage on the probe, if any, please replace the probe with same specifications.
- ⇒ Before using the instrument, please check whether there' s any damage, metal exposed or sign of wear on the insulating layer of the probe, check the connectivity of the probe, if any damage, please do not use.
- ⇒ Before using the instrument, please use it to measure a known voltage to verify whether the instrument works properly.
- ⇒ Use the instrument strictly in accordance with the operation in the manual, otherwise the protection function provided by the instrument may be damaged or weakened.

- ⇒ The instrument shall be used in accordance with the specified measurement category, voltage or current rating.
- ⇒ Please comply with local and national safety code. Wear personal protection equipment (such as approved rubber gloves, masks and flame retardant clothes, etc.) to prevent being damaged by electric shock and electric arc due to exposed hazardous live conductor.
- ⇒ Before connecting the instrument to the circuit under test, be sure to choose the correct input terminal and switch position.
- ⇒ The voltage applied between input terminals or between any terminal and earth point cannot exceed the specified ratings of the instrument.
- ⇒ Please be careful if the measurement exceeds 30V AC true RMS, 42V AC peak or 60V DC. There may be danger of electric shock at this kind of voltage.
- ⇒ When it shows low battery indicator, please replace the battery in time in case of any measurement error.
- ⇒ Do not use the instrument around explosive gas, steam or in wet environment.
- ⇒ When using the probe, please put your fingers behind the finger protector of the probe.
- ⇒ When measuring, please connect the zero line or the ground line firstly, then connect the live wire; but when disconnecting, please disconnect the live wire firstly, then disconnect the zero line and ground line.  
Before opening the outer cabinet or battery cover, please remove the probe on the instrument. Do not use the instrument in the circumstances that the instrument is taken apart or battery cover is opened.
- ⇒ It only meets the safety standards when the instrument is used together with the supplied probe. If the probe is damaged and needs to replace, the probe with same model number and same electrical specifications must be used for replacement.

### 1.4 Safety Symbols

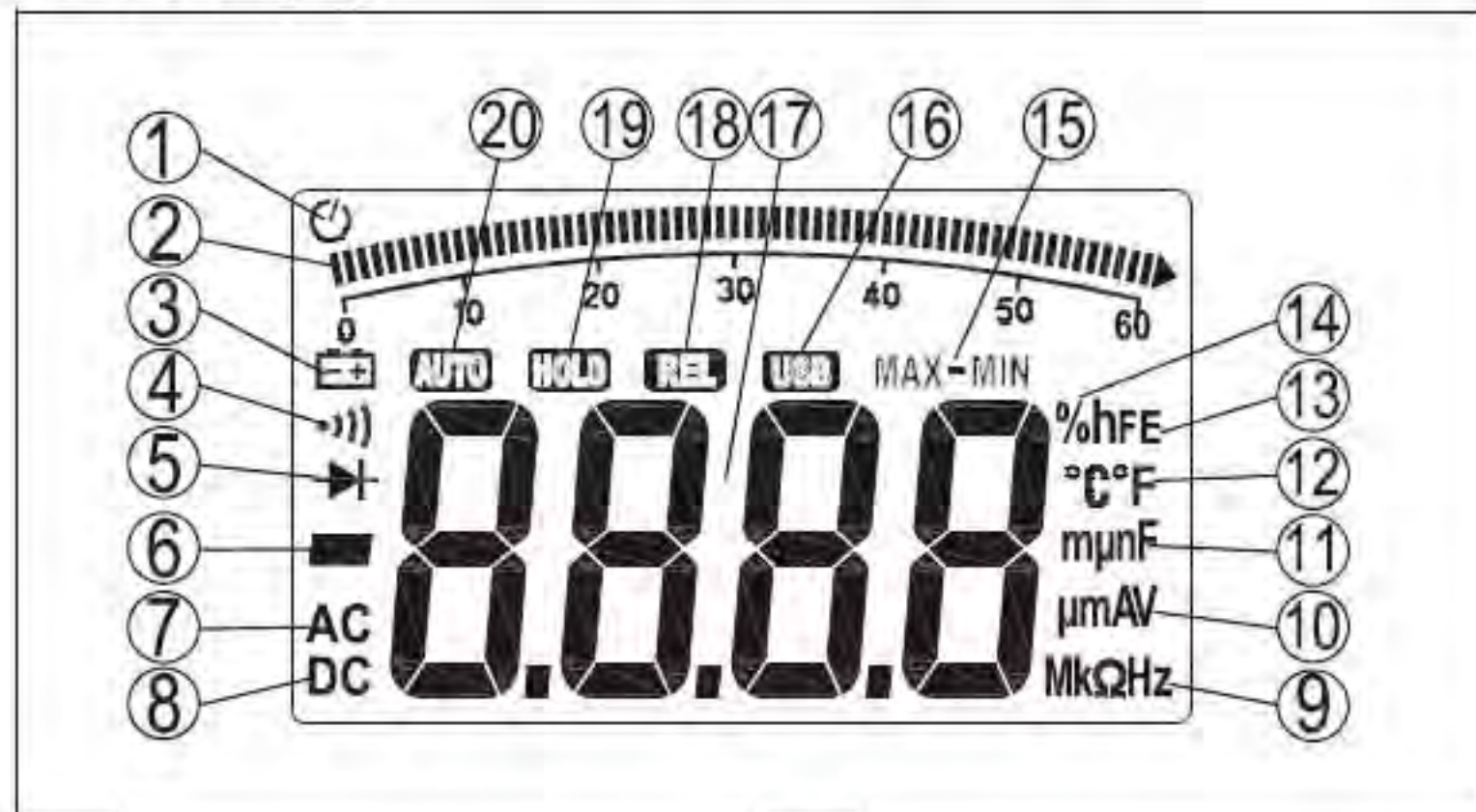
	High voltage warning
	AC (Alternating current)
	DC (Direct current)
	AC or DC
	Warning, important safety signs
	Ground
	Fuse
	Equipment with double insulation or reinforced insulation protection
	Battery undervoltage
	Product complies with all relevant European laws
	The additional product label shows that do not discard this electrical/electronic product into household garbage.
CAT.III 1000V	CAT III 1000 V over-voltage protection
CAT.IV 600V	CAT IV 600 V over-voltage protection



## 2. Overview

The instrument is a hand-held intelligent multifunctional measurement instrument, integrating noise, illuminance, humidity, temperature and digital multimeter into one. With large LCD digital display (three sets of data display) and backlight, it's easy for user to read, with overload protection and battery undervoltage indication. Whether for professionals, factories, schools, amateurs or family, it's an ideal multi-functional instrument.

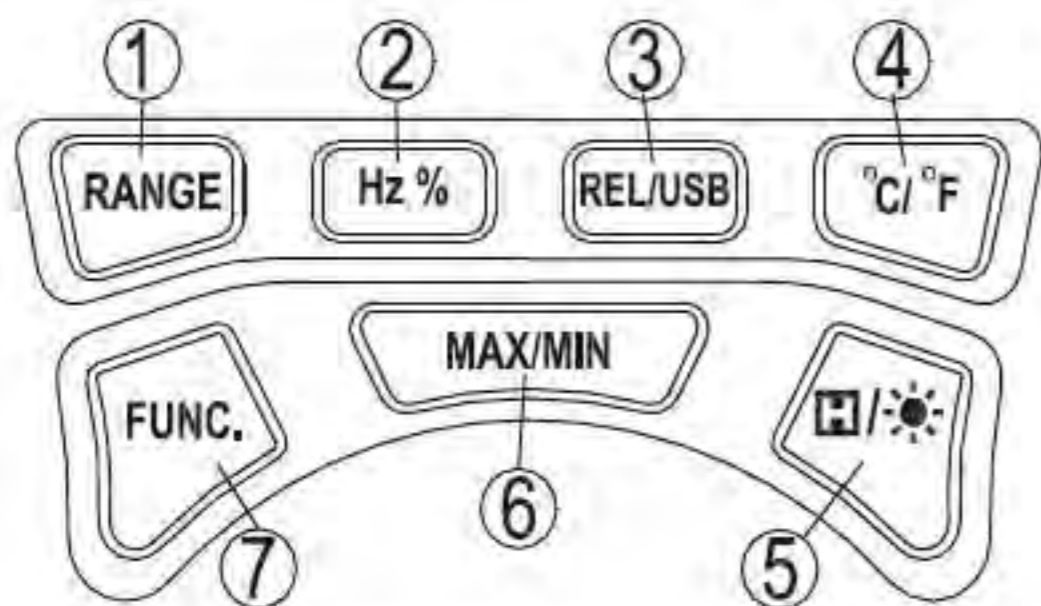
### 2.1 LCD Display




1	Auto Power-off indicator	5	Diode measurement indicator
2	Simulation bar, indicating rapid change trend	6	Minus
3	Battery undervoltage indicator	7	AC indicator
4	Connectivity measurement indicator	8	DC indicator

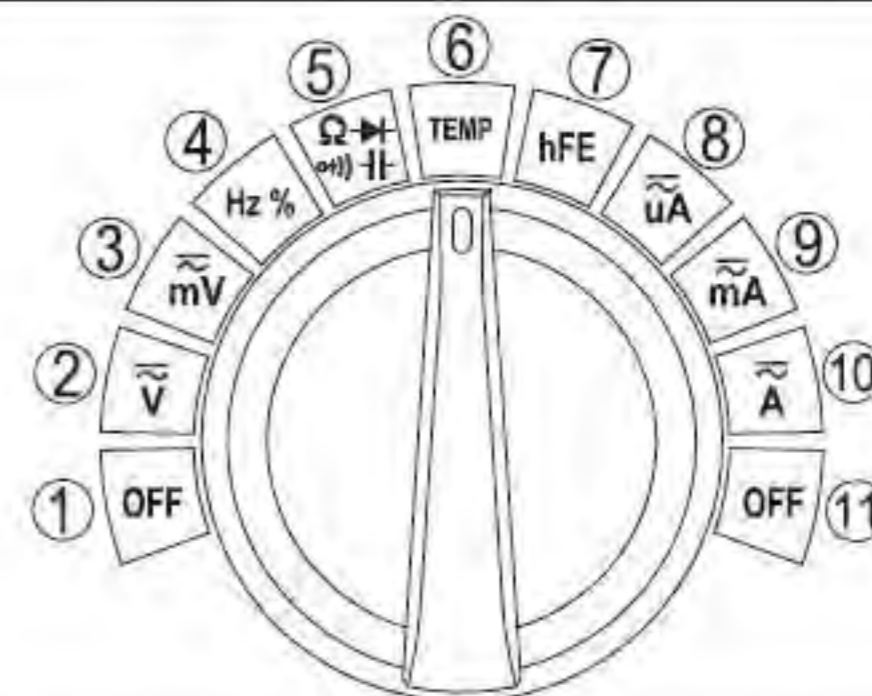
9	Resistance or frequency unit	15	Maximum/Minimum value measurement
10	Voltage or current unit	16	USB interface open indication
11	Capacitance unit	17	Data display area
12	Temperature unit	18	Relative value measurement indicator
13	Transistor indicator	19	Data hold indicator
14	Duty ratio unit	20	Automatic range indicator

## 2.2 Buttons



1	RANGE: switch between automatic range and manual range
2	Hz%: switch between frequency and duty ratio
3	REL/USB: turn on relative measurement and USB
4	°C/°F: switch between centigrade and Fahrenheit
5	 /H: turn on backlight and data hold
6	MAX/MIN: turn on Maximum value, minimum value, maximum-minimum measurement
7	FUNC.: switch among function selections

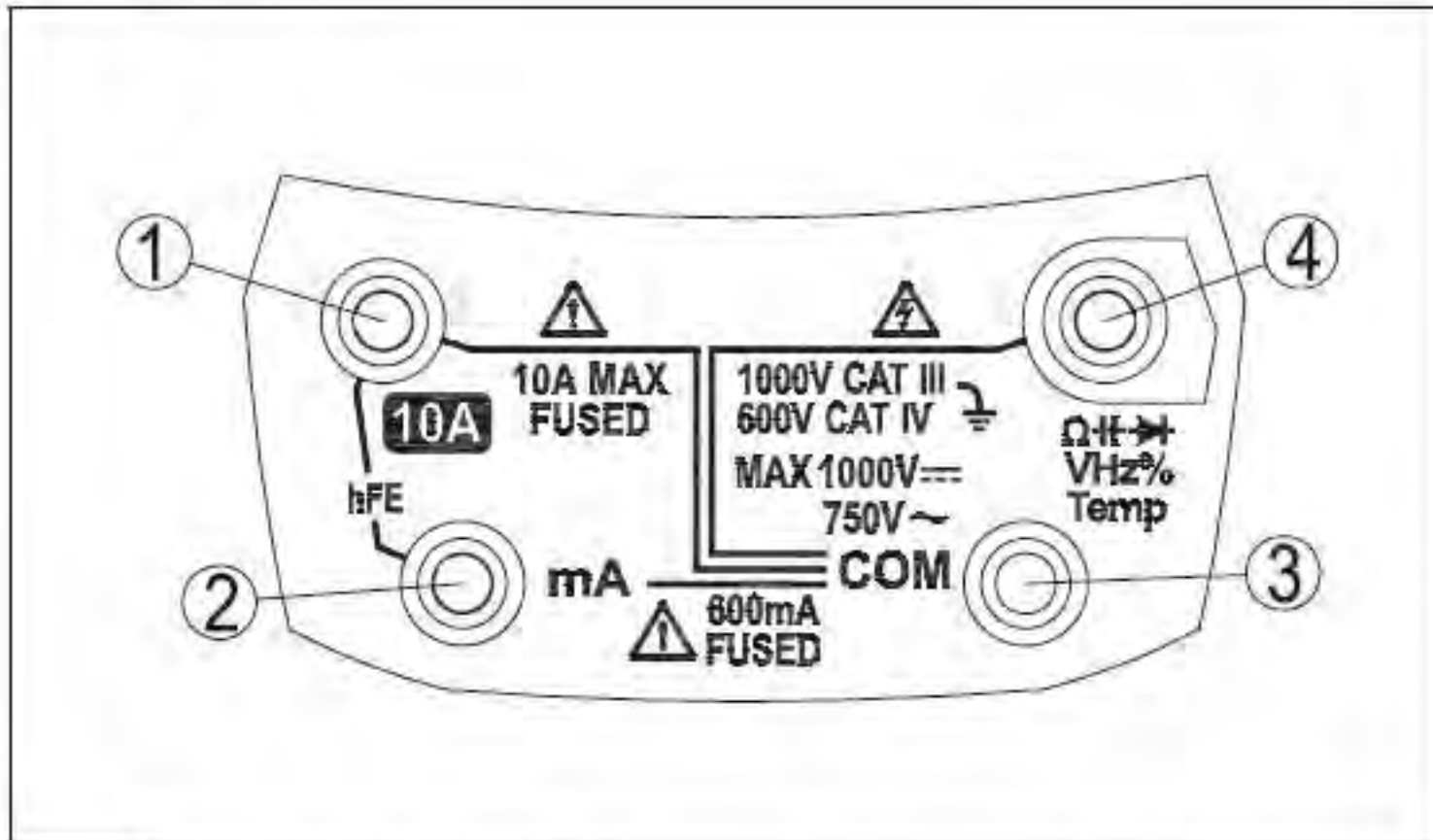
## 2.3 Rotary Switch



1	OFF
2	AC or DC voltage, press FUNCTION button to switch
3	AC or DC voltage mV, press FUNC. button to switch
4	Frequency, duty ratio, press Hz% button to switch
5	Resistance, diode, connectivity, capacitance, press FUNC. button to switch
6	Temperature measurement, press °C/°F button to switch unit
7	Transistor amplification test
8	AC and DC current microampere measurement, press FUNC. button to switch
9	AC and DC current milliampere measurement, press FUNC. button to switch
10	AC and DC current ampere measurement, press FUNC. button to switch
11	OFF

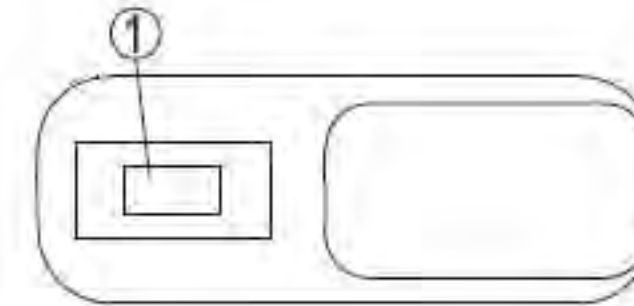


## 2.4 Input Socket



1	Used for AC and DC current measurement (can measure maximum 10A), input socket for frequency/duty ratio measurement (frequency measurement in current mode); when testing transistor, multi function test socket "IN" input socket.
2	Used for AC and DC microampere ( $\mu\text{A}$ ) and milliampere (mA) measurement (can measure maximum 600mA) and input socket for frequency/duty ratio (frequency measurement in current mode); when testing transistor, multi function test socket "COM" input socket.
3	Used for public terminal of all measurement; negative input socket of K type thermocouple temperature measurement.
4	Input socket for voltage, resistance, connectivity, diode, capacitance, frequency, duty ratio measurement; positive input socket of K type thermocouple temperature measurement.

## 2.5 At the Top



1	USB socket, used to connect to the computer.
---	--

## 3. Measurement Operation

### 3.1 Manual and Automatic Range

The instrument is equipped with manual and automatic range. In automatic range mode, the instrument will select the best range for the input signal detected, so it is convenient that the user does not need to re-select range when changing the measuring signal. The instrument can also be set to manual range. It is defaulted as automatic range mode after the unit is turned on or function is switched, the instrument displays "AUTO" symbol. The operations of entering or quitting manual range are as follows:

1. In automatic range mode, press **RANGE** button, "AUTO" symbol hides.
2. Press **RANGE** button to increase the range, when reached the maximum range, the instrument will return to the minimum range.
3. Press and hold **RANGE** button for 2 seconds to quit manual range mode, the instrument displays "AUTO" symbol.



**Note** ⚠

Duty ratio, connectivity, diode, temperature and transistor measurement function has only one range.



### 3.2 Relative Value Measurement

The instrument is equipped with relative value measurement function. In this mode, the instrument display value=actual value-set reference value. Operations of entering or quitting relative measurement are as follows:




1. Set the instrument to the measurement function you need, contact the probe to the measured object which you want to set as reference value, the instrument displays the measured value.
2. Press  button and store the measured value as reference value, enter the relative measurement mode, the instrument displays "REL" symbol.
3. Measure, the instrument will display "actual value-set reference value" .
4. Then press  button and quit relative value measurement mode, the "REL" symbol hides.


#### Note

Frequency, duty ratio, diode, connectivity, temperature, and and transistor measurement has no relative value measurement mode.

### 3.3 Maximum Value/Minimum Value/Maximum-minimum Value Hold

The instrument is equipped with maximum value, minimum value and maximum-minimum value hold function. Operations of entering or quitting this function are as follows:

1. Set the instrument to the measurement function you need.
2. Press  button to enter maximum value hold mode, the instrument displays "MAX" symbol.
3. Press  button again to enter minimum value hold mode, the instrument displays "MIN" symbol.
4. Press  button again to enter maximum-minimum value hold mode, the instrument displays "MAX-MIN" symbol.

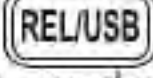
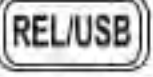
5. Press and hold  button longer than 2 seconds, the instrument returns to normal measurement mode.

#### Note

Frequency, duty ratio, diode, connectivity and transistor measurement does not have this function.

### 3.4 USB Interface Function

The instrument is equipped with USB interface function, instrument measured data can be uploaded to the computer for display, record and analysis via USB port. Operations of entering or quitting this function are as follows:

1. Scroll the rotary switch of the instrument to any shift except "OFF" .
2. Press and hold  button longer than 2 seconds, the instrument displays "USB" symbol, the function of instrument data transmission is enabled.
3. Press and hold  button longer than 2 seconds, the "USB" symbol hides, the function of instrument data transmission is off.

#### Note

please refer to the interface software operation instructions for detailed operations.

### 3.5 Measure AC or DC Voltage

As shown in the figure below:

1. Scroll the rotary knob to  $\tilde{V}$ , press "FUNC." button and switch to AC voltage or DC voltage function.
2. Insert the red probe in " $\tilde{V}$ " socket, and the black probe in "COM" socket.
3. Contact the probe to the measured circuit (connect to the measured power supply or circuit in parallel), measure the voltage.
4. Read the measurement result on the screen.

#### Note

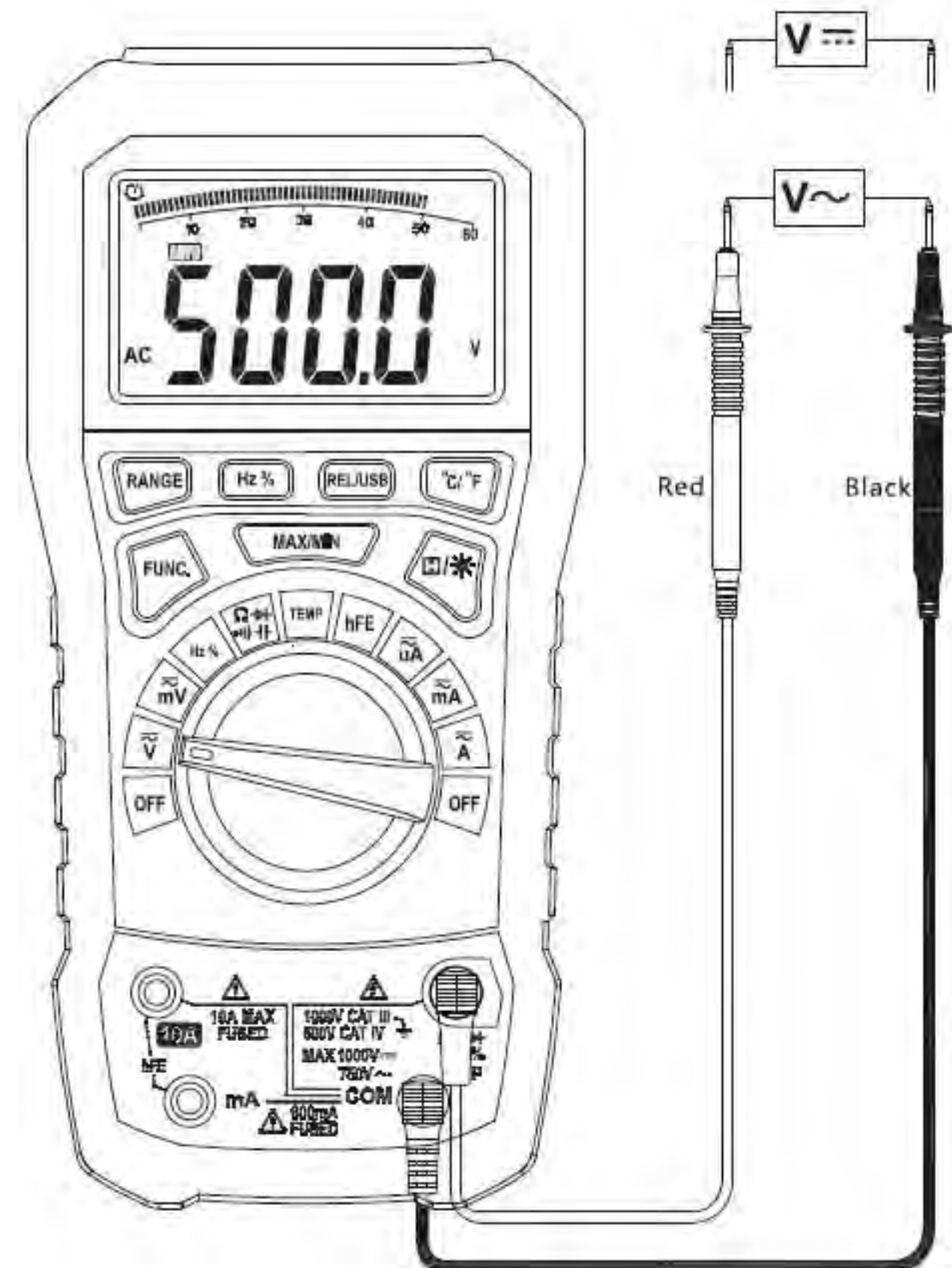


- ◆ In AC voltage function, press Hz% button to measure the frequency and duty ratio of the AC voltage source, please refer to Measure Frequency.
- ◆ The AC voltage value measured by using this instrument is true RMS (root mean square). For sine wave and other wave (no DC offset), such as square wave, triangle wave and step wave, these measurements are accurate.

#### Warning



- ◆ Do not allow measurement of any voltage higher than DC 1000V or AC 750VRMS, otherwise it may cause instrument damage, electric shock or personal injuries.
- ◆ Do not allow applying voltage exceeding DC 1000V or AC 750V RMS between a public terminal and the earth, otherwise it may cause instrument damage, electric shock or personal injuries.





### 3.6 Measure DC or AC mV Voltage

As shown in the figure below:

1. Scroll the rotary knob to "**mV**" , press "FUNC." button and switch to DC or AC voltage function.
2. Insert the red probe in "**VHz%**" socket and the black probe in "COM" socket.
3. Contact the probe to the measured circuit (connect to the measured power supply or circuit in parallel), measure the voltage.
4. Read the measurement result on the screen.

#### Note

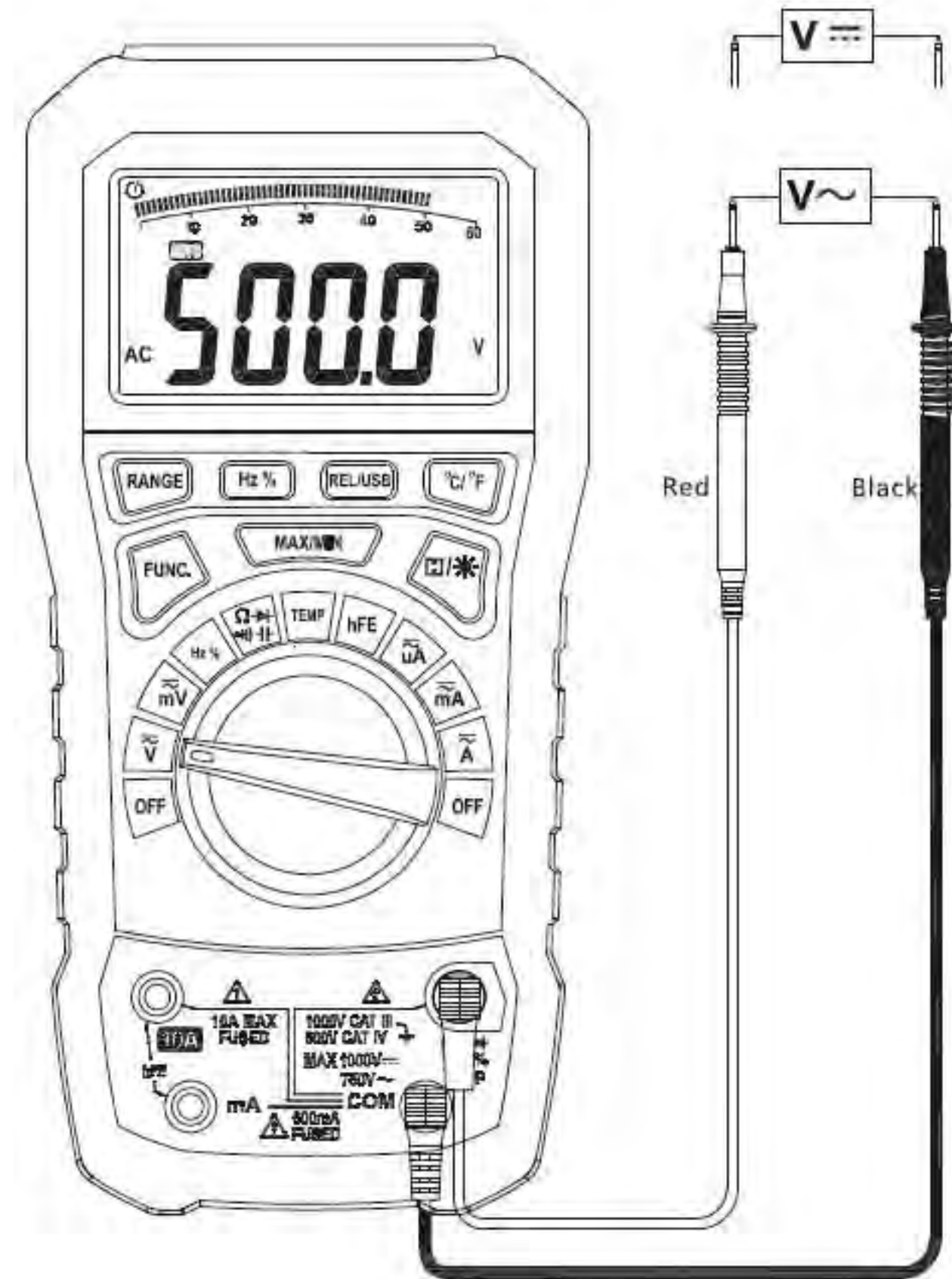


- ◆ In AC voltage function, press Hz% button to measure the frequency and duty ratio of the AC voltage source, please refer to Measure Frequency.
- ◆ The AC voltage value measured by using this instrument is true RMS (root mean square). For sine wave and other wave (no DC offset), such as square wave, triangle wave and step wave, these measurements are accurate.
- ◆ The maximum range for AC/DC mV (60/600mV) voltage measurement is 600mV, input impedance up to 1011Ω, and the weak signal of measurement will not weaken, therefore the measurement precision is high. But it' s normal in the circumstances that the probe is in open circuit or contacting the measured circuit, the probe will be back to zero as long as in short circuit, the reading will stabilize.

#### Warning



- ◆ Do not allow measurement of any voltage higher than DC 1000V or AC 750VRMS, otherwise it may cause instrument damage, electric shock or personal injuries.
- ◆ Do not allow applying voltage exceeding DC 1000V or AC 750V RMS between a public terminal and the earth, otherwise it may cause instrument damage, electric shock or personal injuries.



### 3.7 Measure Frequency and Duty Ratio

As shown in the figure below:

1. Scroll the rotary knob to "Hz%", press "Hz%" button and switch between frequency and duty ratio. (or in AC voltage or AC current shift frequency and duty ratio can also be measured)
2. Insert the red probe in "Ω/Hz%  
VHz%  
Temp" socket and the black probe in "COM" socket.
3. Contact the probe to the measured circuit (connect to the measured power supply or circuit in parallel), measure the frequency or duty ratio.
4. Read the measurement result on the screen.

#### Warning

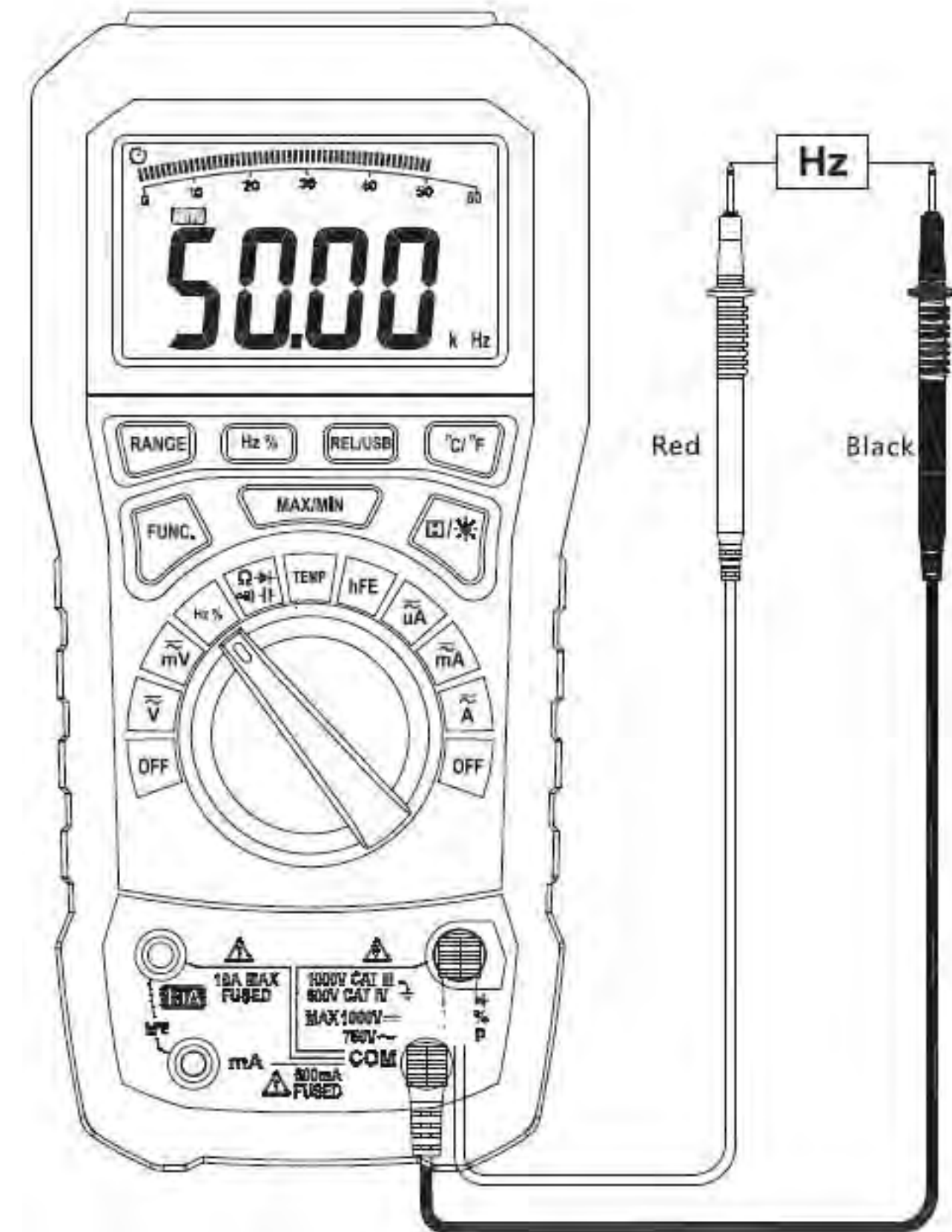


- ◆ Do not allow measurement of any voltage higher than DC 1000V or AC 750VRMS, otherwise it may cause instrument damage, electric shock or personal injuries.
- ◆ Do not allow applying voltage exceeding DC 1000V or AC 750V RMS between a public terminal and the earth, otherwise it may cause instrument damage, electric shock or personal injuries.

#### Caution



To avoid any damage on the instrument or the equipment, do not input frequency or duty ratio signal higher than 10V RMS.





### 3.8 Measure AC or DC Current

As shown in the figure below:

1. According to the current of measurement scroll the rotary knob to any shift among " $\tilde{\mu}A$ ", " $\tilde{mA}$ " and " $\tilde{A}$ ", press "FUNC." button and switch to AC or DC function.
2. According to the shift of measurement insert the red probe in "mA" socket or 10A socket, and the black probe in "COM" socket.
3. Disconnect the power supply of the measured circuit, connect the probe to the measured circuit in series, and turn on the power supply of the circuit.
4. Read the measurement result on the screen.

**Warning**

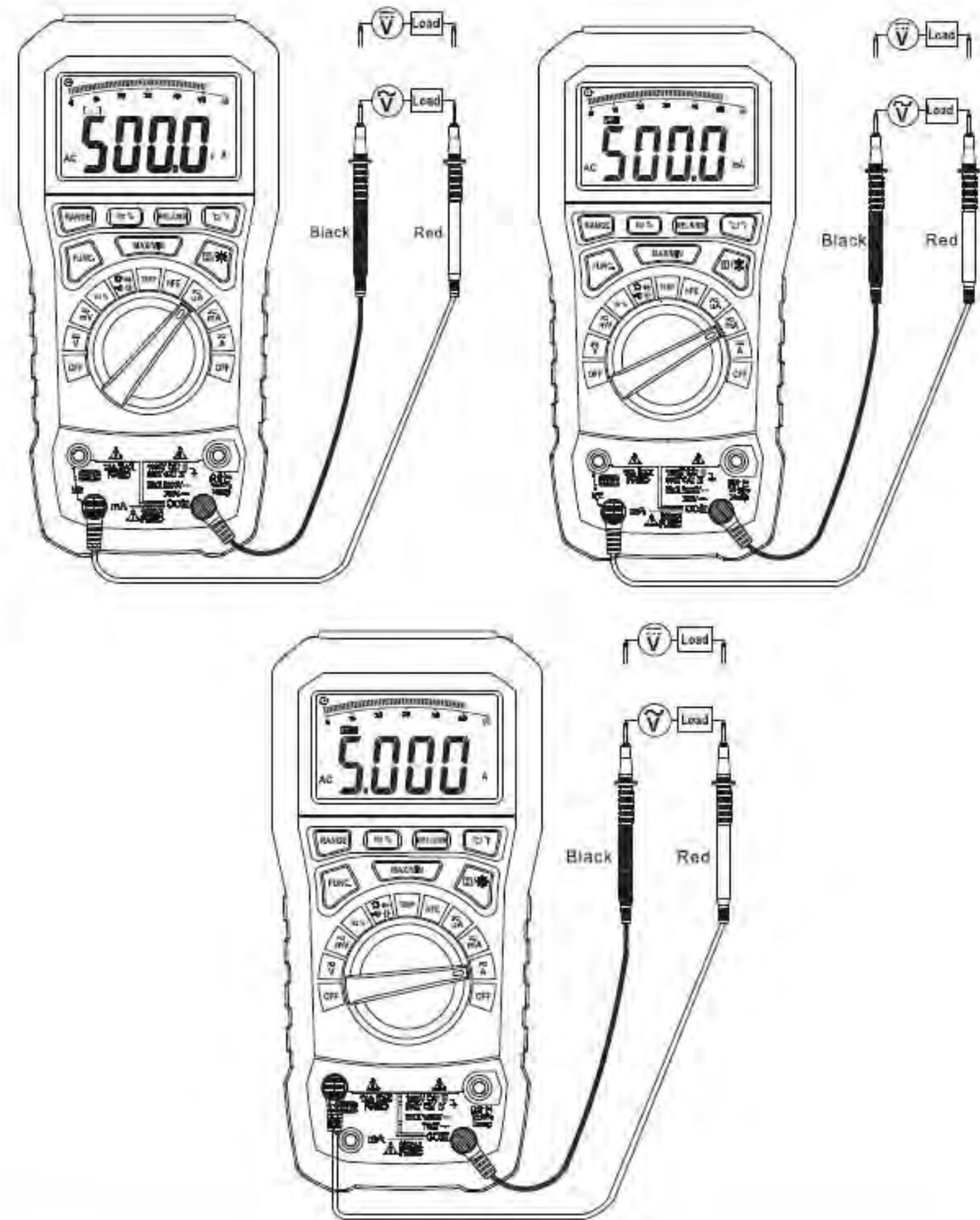


Do not allow measurement of any voltage higher than DC 1000V or AC 750V RMS, otherwise it may cause instrument damage, electric shock or personal injuries. The power supply of the measured circuit must be switched off firstly, otherwise it may cause electric shock or personal injuries.

**Caution**



To avoid any damage on the instrument or equipment, please check the fuse before measurement, and use correct input socket.



### 3.9 Measure Resistance

As shown in the figure below:

1. Scroll the rotary knob to " $\Omega$ " , press "FUNC." button and switch to resistance measurement function.
2. Insert the red probe in " $\Omega$ " socket, and the black probe in "COM" socket.
3. Contact the probe to the measured circuit or both ends of the resistor.
4. Read the measurement result on the screen.

#### Warning

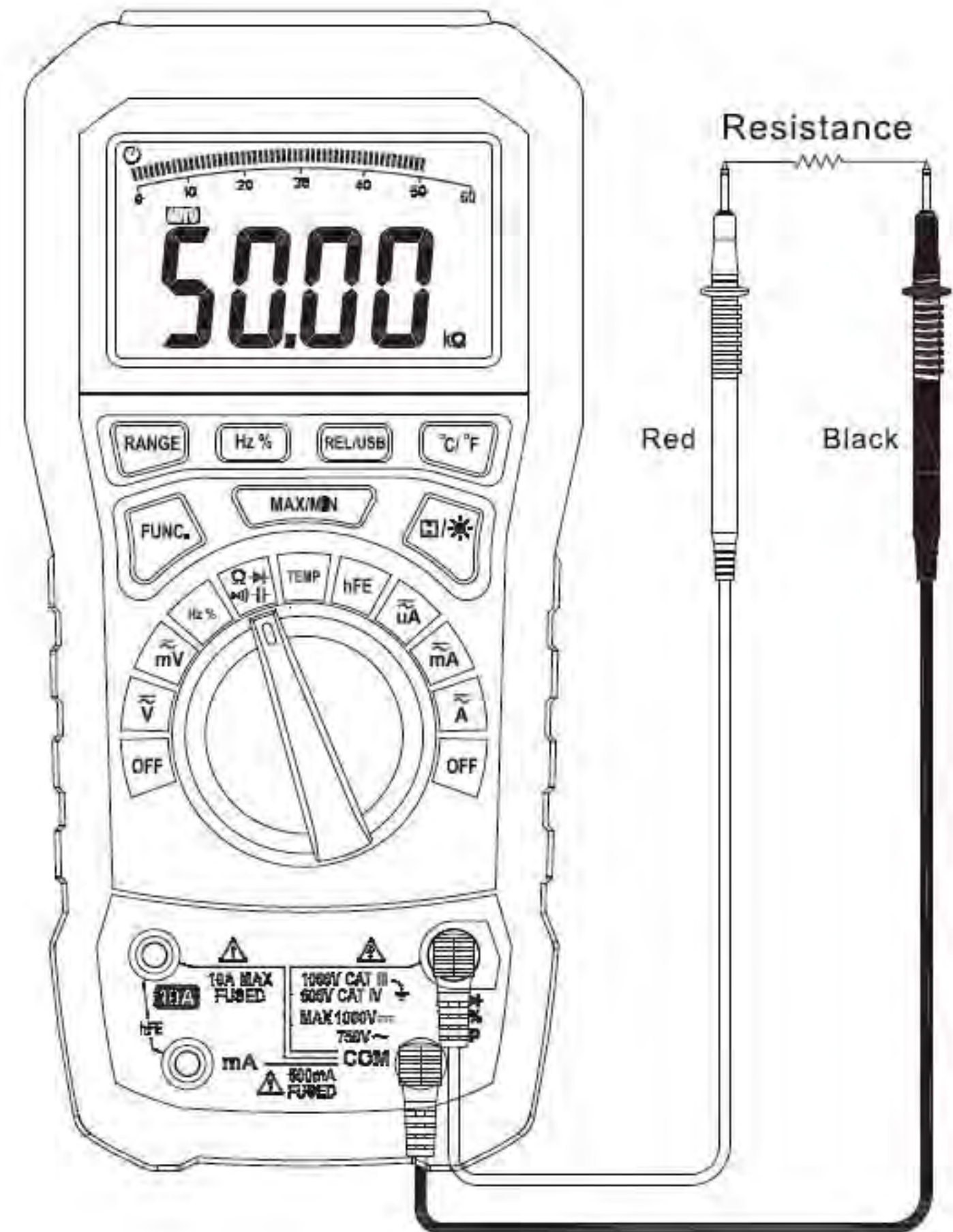


Before measuring resistance, connectivity, capacitance or diode, please turn off the power supply and discharge all the high voltage capacitors, otherwise it may cause instrument damage, electric shock or personal injuries.

#### Note



Because the test current of the instrument will pass through all the routes between the probe, therefore the measured value of the resistors in the circuit is usually different from the rating of the resistor.





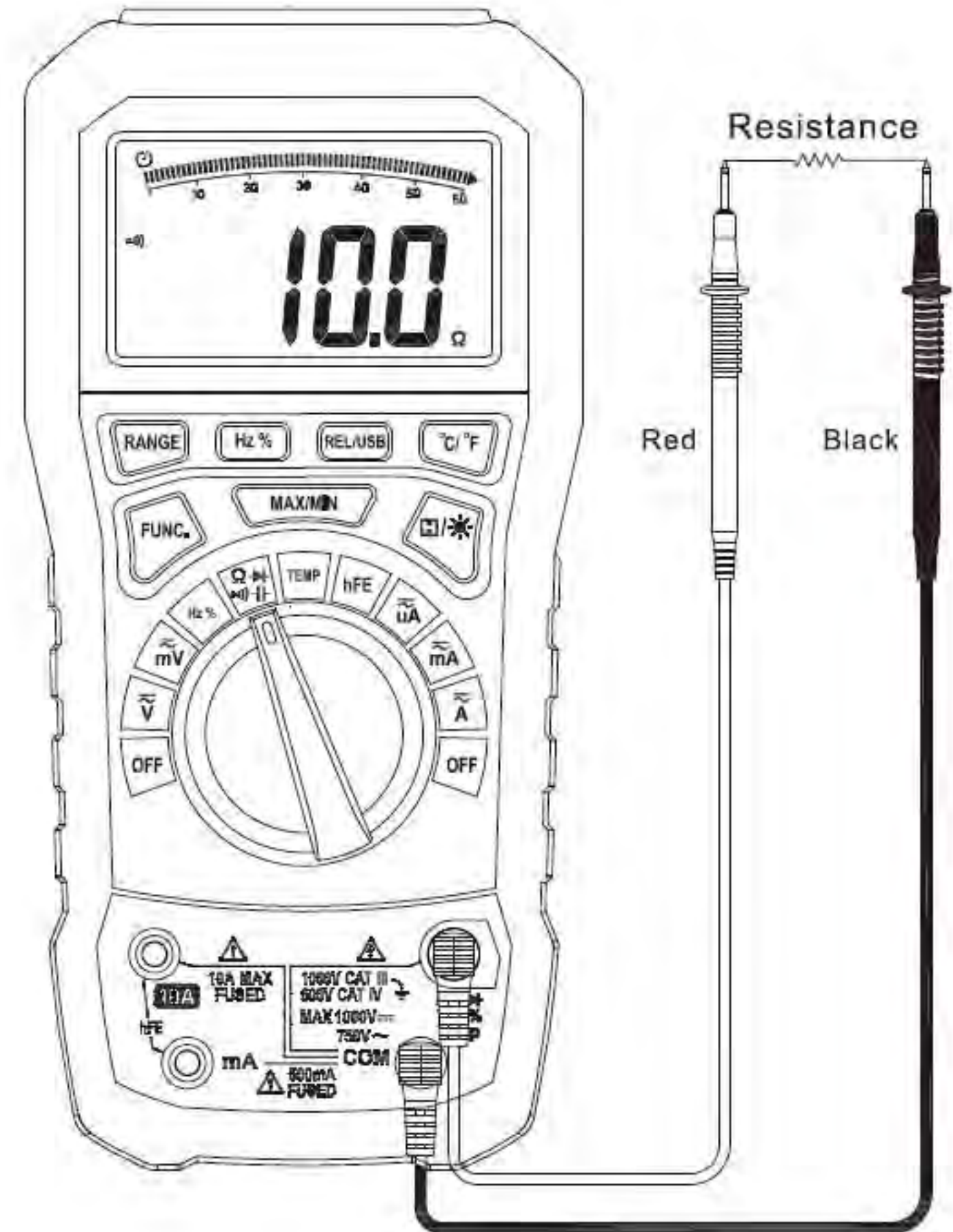
### 3.10 Measure Connectivity

As shown in the figure below:

1. Scroll rotary knob to " $\Omega$ " , press "FUNC." button and switch to connectivity measurement function, and ensure that the power supply of the measured circuit has been cut off.
2. Insert the red probe in " $\Omega$ " socket, and the black probe in "COM" socket.
3. Contact the probe to the measured circuit or both ends of the resistance.
4. If the resistance of the measured resistance or circuit is lower than  $50\Omega$ , the buzzer will sound.
5. At the same time the resistance of the measured circuit is displayed on the screen.

#### Warning

Before measuring resistance, connectivity, capacitance or diode, please turn off the power supply and discharge all the high voltage capacitors, otherwise it may cause instrument damage, electric shock or personal injuries.



### 3.11 Measure Capacitance

As shown in the figure below:

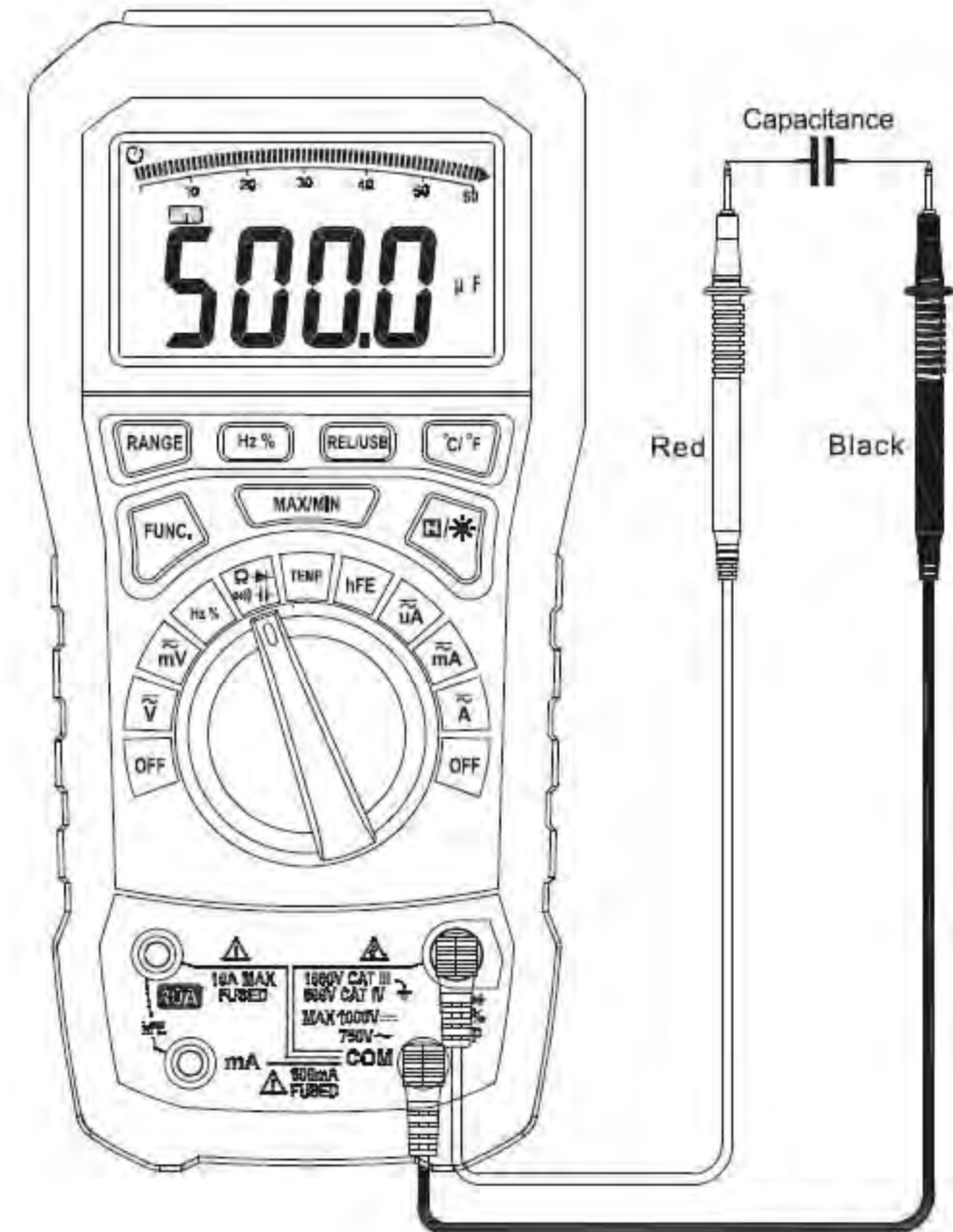
1. Scroll the rotary knob to "Ω⇄" , press "FUNC." button and switch to capacitance measurement function.
2. Insert the red probe in "Ω⇄" socket, and the black probe in "COM" socket
3. Contact the probe to both ends of the capacitor.
4. After the reading is stable, read the measurement result on the screen.

#### Warning

Before measuring resistance, connectivity, capacitance or diode, please turn off the power supply and discharge all the high voltage capacitors, otherwise it may cause instrument damage, electric shock or personal injuries.

#### Note

- ◆ In the circumstance that the input is open circuit, the instrument may display reading, press "REL" button to make it back to zero and measure again.
- ◆ When measuring small capacitance (below 100nF), you' d better enable the relative value measurement function to reduce the measurement error brought by the base number of the probe or instrument.





### 3.12 Measure Diode

As shown in the figure below:

1. Scroll the rotary knob to " $\Omega \rightarrow \rightarrow$ ", press "FUNCTION" button and switch to diode measurement function.
2. Insert the red probe in " $\Omega \rightarrow \rightarrow$ " socket, and the black probe in "COM" socket.
3. Contact the red probe to the anode of the measured diode, and the black probe to the cathode of the measured diode.
4. Read the measurement results on the screen.
5. If the polarity of the probe and the diode are opposite, the instrument displays "OL", which can be used to differentiate the anode and cathode of the diode.

#### Warning

Before measuring resistance, connectivity, capacitance or diode, please turn off the power supply and discharge all the high voltage capacitors, otherwise it may cause instrument damage, electric shock or personal injuries.

#### Note

The instrument can display as high as 1.5V diode forward bias. A typical diode forward bias is in the range from 0.3V to 0.8V; however, readings may be different due to the different resistances of other circuits between the probes.





### 3.13 Measure Temperature

1. Scroll the rotary knob to "TEMP".
2. Insert K type thermocouple in the input socket of the instrument, insert the positive end of the thermocouple (red) in "OH $\rightarrow$ " socket, and the negative end (black) in "COM" socket.
3. Contact the probe of the thermocouple to the measured object, read the result from the main display area on the screen.
4. Press "°C/°F" button, switch between centigrade and Fahrenheit unit.

#### Note

- ◆ When the thermocouple is not inserted or open circuit, the instrument will display the temperature of the environment.
- ◆ The instrument is not suitable for measuring the temperature of a rapidly changing environment.
- ◆ The cold junction compensation of the thermocouple is set in the instrument, and it takes longer time to reach thermal balance with the measurement environment. So when measuring it needs to be placed in the measurement environment for a longer time to obtain more accurate readings.
- ◆ The instrument uses K type thermocouple probe.

#### Warning

When measuring temperature by thermocouple, the probe of the thermocouple cannot contact the charged object, otherwise it may cause instrument damage, electric shock or personal injuries.

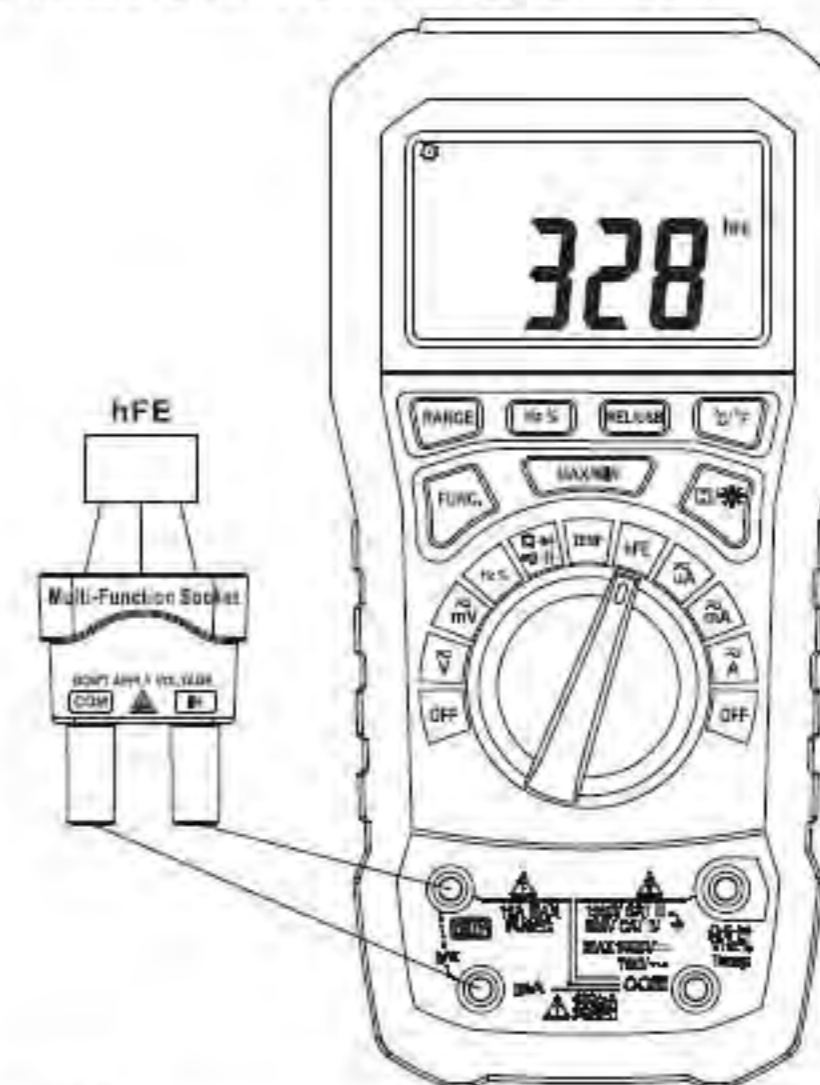
#### Caution

Please do not fold the thermocouple wire into acute angle. Repeatedly bending the wire over a period of time may cause the broken of the wire.

### 3.14 Measure Transistor

As shown in below figure:

1. Scroll the rotary knob to "hFE", and remove the probe from the instrument.
2. Insert the multi functional test socket in "10A" and "mA" sockets as shown in the figure on the right.
3. Insert the transistor in the corresponding socket of the multi functional test socket.
4. Read the measurement results on the screen.



#### Warning

Please do not use multi functional test socket in voltage and current measurement. Otherwise it may cause instrument damage, electric shock or personal injuries.



**Caution**



When using multi functional test socket, please pay attention to the direction of the insertion, if insert reverse the test result will be wrong.

**4. Auto Power-off Function**

1. If there' s no any operation within 15 minutes after the unit is turned on, the instrument will enter the sleep state, it will power off automatically to save the battery power.
2. After power off automatically, if toggle rotary switch or press any button, the instrument returns to work.
3. If press "FUNC." button to turn on the unit and cancel auto power-off function.



**Note**



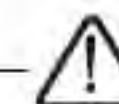
When USB function is enabled, the instrument will not enter the sleep state.


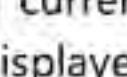
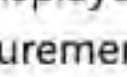
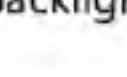
**5. Backlight Function**

The instrument is equipped with backlight function for the convenience that the user accurately read the measurement results in places with bad lighting conditions. Operations of turning on or off the backlight are as follows:



1. Press and hold "" button longer than 2 seconds to turn on the backlight.
2. Press and hold "" button longer than 2 seconds again to turn off the backlight; or after about 15 seconds the backlight will turn off automatically.

**Note**



- ◆ The backlight source is LED, the working current is larger, although the instrument is equipped with a timing circuit (the timing time is about 15 seconds, that is, it will turn off automatically about 15 seconds after the backlight is turned on), often using the backlight will shorten the battery life, so in unnecessary circumstances, the use of backlight source should be minimized.
- ◆ When the battery voltage is  $\leq 4.8V$ , the display shows "" (undervoltage) symbol. But in the circumstance of using the backlight, when the battery voltage is  $\geq 4.8V$ , because its larger working current makes the battery voltage drop, "" symbol may be displayed (when "" symbol displays, the accuracy of the measurement cannot be guaranteed), at this time it' s fine that do not replace the battery, continue to use it in the circumstance of not using backlight until "" symbol is displayed, then make replacement.

**6. Data Hold**

1. In the process of measurement, if reading hold is needed, press "" button, the display value on the screen will be maintained.
2. Press "" button again to clear the state of reading hold.

## 7. General Technical Specifications

- Environment condition of using:  
600V CAT.IV and 1000V CAT.III  
Pollution level: 2  
Altitude < 2000m  
Working environment temperature and humidity: 0~40°C (<80% RH, <10°C non condensing).  
Storage environment temperature and humidity: -10~60°C (<70% RH, remove the battery).
- Temperature coefficient: 0.1× accuracy/°C (<18°C or >28°C).
- MAX. Voltage between terminals and earth ground:1000V DC or 750V AC RMS
- Fuse protection: mA: fuse F600mA/1000V fast speed fuse; 10A shift: F10A/1000V fast speed fuse
- Sampling rate: about 3 times/second.
- Display: 6000 counter readout. Automatically display the unit symbols according to the shift of the measurement function.
- Over range indication: it displays "OL" .
- Low battery indication: when the battery voltage is lower than the normal working voltage, "⊖+" will be displayed.
- Input polarity indication: automatically display "—" .
- Power requirement: 4 x 1.5V AA batteries.
- Dimension: 204(L) ×94(W) × 57(H) mm.
- Weight: about 410g (including batteries).

## 8. Accuracy Specifications

The accuracy applies within one year after the calibration.

Reference condition: the environment temperature 18°C to 28°C, the relative humidity is no more than 80%, accuracy: ± ( % reading + word ) .

## 8.1 DC Voltage

Range	Resolution	Accuracy	Input impedance: 10MΩ(60/600mV range is 1011Ω) Overload protection: 1000V DC or 750V AC (RMS) Maximum input voltage: 1000V DC <b>Note:</b> Measure in mV (60/600mV) voltage, input impedance is as high as 1011Ω, and weak signal of measurement does not weaken, so the measurement precision is high. But in the circumstance that the probe is open circuit it will display numbers, which is normal, as long as in short circuit the probe will return to zero or the probe is inserted to the measured point, the reading will stabilize.
60mV	0.01mV	±(0.7% reading+2)	
600mV	0.1mV		
6V	1mV		
60V	10mV		
600V	100mV		
1000V	1V		

## 8.2 AC Voltage

Range	Resolution	Accuracy	Input impedance: 10MΩ(60/600mV range is 1011Ω) Overload protection: 1000V DC or 750V AC (RMS) Maximum input voltage: 750V AC (RMS) Frequency range: 10Hz ~ 1kHz; response: true RMS <b>Note:</b> Measure in mV (60/600mV) voltage, input impedance is as high as 1011Ω, and weak signal of measurement does not weaken, so the measurement precision is high. But in the circumstance that the probe is open circuit it will display numbers, which is normal, as long as in short circuit the probe will return to zero or the probe is inserted to the measured point, the reading will stabilize.
60mV	0.01mV	±(0.8% reading+3)	
600mV	0.1mV		
6V	1mV		
60V	10mV		
600V	100mV		
750V	1V		



## 8.3 DC Current

Range	Resolution	Accuracy	Overload protection: $\mu\text{A}/\text{mA}$ range: 600mA/1000V fuse (fast speed fuse) 10A range: 10A/1000V fuse (fast speed fuse) Maximum input current: mA socket: 600mA 10A socket: 10A When measuring large current, continuous measurement should be not longer than 15 seconds, after measurement the instrument should be cooled down after twice of the measurement time, and then enter small current measurement.
600 $\mu\text{A}$	0.1 $\mu\text{A}$	$\pm(1.2\%$ reading +3)	
6000 $\mu\text{A}$	1 $\mu\text{A}$		
60mA	10 $\mu\text{A}$		
600mA	100 $\mu\text{A}$		
6A	1mA	$\pm(2.0\%$ reading +10)	
10A	10mA		

## 8.4 AC Current

Range	Resolution	Accuracy	Overload protection: $\mu\text{A}/\text{mA}$ range: 600mA/1000V fuse (fast speed fuse) 10A range: 10A/1000V fuse (fast speed fuse) Maximum input current: mA socket: 600mA 10A socket: 10A Frequency range: 10Hz ~ 1kHz Response: true RMS When measuring large current, continuous measurement should be no longer than 15 seconds, after measurement the instrument should be cooled down after twice of the measurement time, then enter small current measurement.
600 $\mu\text{A}$	0.1 $\mu\text{A}$	$\pm(1.5\%$ reading +3)	
6000 $\mu\text{A}$	1 $\mu\text{A}$		
60mA	10 $\mu\text{A}$		
600mA	100 $\mu\text{A}$		
6A	1mA	$\pm(3.0\%$ reading +10)	
10A	10mA		

## 8.5 Resistance

Range	Resolution	Accuracy	Open circuit voltage: about 0.25V Overload protection: 1000V DC or 750V AC (RMS)
600 $\Omega$	0.1 $\Omega$	$\pm(1.2\%$ reading+5 )	
6k $\Omega$	1 $\Omega$		
60k $\Omega$	10 $\Omega$		
600k $\Omega$	100 $\Omega$		
6M $\Omega$	1k $\Omega$	$\pm(2.0\%$ reading+5 )	
60M $\Omega$	10k $\Omega$		

## 8.6 Capacitance

Range	Resolution	Accuracy	Overload protection: 1000V DC or 750V AC (RMS) <b>Note:</b> Parameter does not include error caused by the capacitor and capacitor substrate of the probe (in 100nF range may be up to a few nF). The user can use the relative value measurement function to reduce the error.
10nF	0.001nF	$\pm(3.0\%$ reading +3)	
100nF	0.01nF		
1000nF	0.1nF		
10 $\mu\text{F}$	0.001 $\mu\text{F}$		
100 $\mu\text{F}$	0.01 $\mu\text{F}$		
1000 $\mu\text{F}$	0.1 $\mu\text{F}$		
10mF	0.001mF		



## 8.7 Frequency and duty ratio


Range	Resolution	Accuracy	
10Hz	0.001Hz	±(1.0% reading + 5)	Through shift of Hz: 1 ) Measurement range: 0 ~ 10MHz 2 ) Input voltage range: 0.2~10V AC (the input voltage should be increased with the increase of the measured frequency) 3 ) Overload protection: 1000V DC or 750V AC (RMS) Through shift V: 1 ) Measurement range: 0 ~ 100kHz 2 ) Input voltage range: 0.5~750V AC (the input voltage should be increased with the increase of the measured frequency) 3 ) Maximum input voltage: 1000V DC or 750V AC (RMS) Through shifts of $\mu$ A, mA, A: 1 ) Measurement range: 0 ~ 100kHz 2 ) Input signal range: $\geq \frac{1}{4}$ range (the input current should be increased with the increase of the measured frequency) 3 ) Input protection: $\mu$ A, mA range: F600mA/1000V ultra-speed fuse; 10A range: F10A/1000V ultra-speed fuse
100Hz	0.01Hz		
1000Hz	0.1Hz		
10kHz	0.001kHz		
100kHz	0.01kHz		
1000kHz	0.1kHz		
10MHz	0.001MHz		
1~99%	0.1%	3.0%	

 Note


Compared with the range of measurement by using the "Hz" function of voltage and current shifts, using shift "Hz" to measure the frequency has larger range and higher sensitivity.



## 8.8 Diode Test

Range	Resolution	Accuracy	
	1mV	It displays the approximate forward voltage value of the diode.	Forward DC current is about 1mA Reverse DC voltage is about 1.5V Overload protection: 1000V DC or 750V AC (RMS)

## 8.9 Connectivity Test

Range	Function	
	The resistance of the measured circuit is less than 50 $\Omega$ , the buzzer contained in the instrument will sound.	Open circuit voltage is about 0.5V Overload protection: 1000V DC or 750V AC (RMS)

## 8.10 Temperature

Range	Resolution	Accuracy		
°C	1°C	-20°C ~ 0°C	± 5.0% reading or ± 3°C	Overload protection: 1000V DC or 750V AC (RMS)
		0°C ~ 400°C	± 1.0% reading or ± 2°C	
		400°C ~ 1000°C	± 2.0% reading	
°F	1°F	-4°F ~ 32°F	± 5.0% reading or ± 6°F	
		32°F ~ 752°F	± 1.0% reading or ± 4°F	
		752°F ~ 1832°F	± 2.0% reading	



1. The above accuracy specifications are specified in the same operating environment after kept the instrument in a fixed state for at least 1 hour. If the instrument is exposed to the environment of high humidity (condensation) during the storage period, please ensure that the instrument should be kept in the same operating environment at least 2 hours.
2. Accuracy does not contain the tolerance of the thermocouple probe.
3. The temperature is calculated and calibrated in accordance with the safety standard EN/IEC-60548-1 and NIST175.

## 9. Maintenance

### 9.1 Clean the Instrument

If there' s dust on the terminal or the terminal is wet, it may cause measurement error. Please clean the instrument according to the steps below:

1. Switch off the power supply of the instrument, and remove the test probe.
2. Turn over the instrument and shake out the dust accumulated in the input socket. Wipe the outer cabinet with a damp cloth and mild detergent, do not use abrasive or solvent. Wipe contacts in each input socket with a clean cotton swab soaked in alcohol.

#### Warning



Please always keep the inside of the instrument clean and dry to avoid electric shock or instrument damage.

## 9.2 Replace Battery and Fuse

### 9.2.1 Replace Battery

- ① Turn off the power supply of the instrument, and remove the probe on the instrument.
- ② Use screwdriver to unscrew two screws fixing the battery cover, remove the battery cover.
- ③ Remove old batteries, replace with new batteries of the same specifications. Please note the polarity of the battery according to the positive and negative polarity marks inside of the battery cover.
- ④ Install the battery cover to its original position, fix and lock the battery cover with screws.

#### Warning



- ◆ To prevent electric shock or personal injury caused by error reading, please replace the battery promptly when the battery power is low. Please do not make battery short circuit or reverse battery polarity to discharge the batteries.
- ◆ To ensure safety operation and product maintenance, when the instrument will not be used for an extended period of time, please remove the batteries to avoid any product damage caused by battery leakage.

### 9.2.2 Replace Fuse

- ① Turn off the power supply of the instrument, and remove the probe on the instrument.
- ② Use screwdriver to unscrew four screws fixing the back cover (four corners of the instrument), and remove the back cover.
- ③ Remove the burnt fuse, replace with new fuse of the same specifications, and ensure that the fuse is clamped in the safety clip.
- ④ Install the back cover, fix and lock it with screws.

#### Warning



To avoid possible electric shock, personal injury or instrument damage, please use the fuse with same specifications or specified specifications.