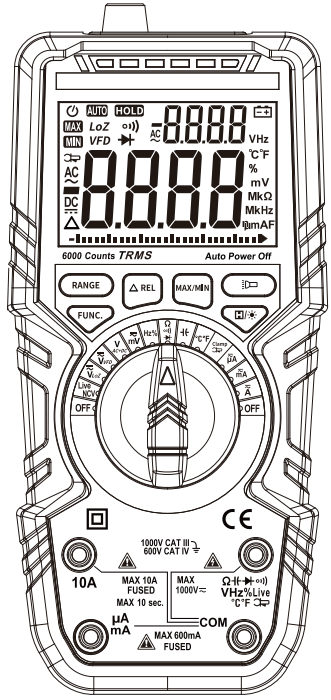
USERS MANUAL

Digital Multimeter with T-RMS



The pictures are for reference only, and the product is subject to the actual product.

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

Y01-04-0237

Before using the instrument,please read this manual carefully,and save it well for future using.

尺寸：142X100MM
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1.General Information

This digital multimeter is designed and manufactured in compliance with EN/IEC-61010 safety requirements on electronic measuring meters and hand-held digital multi-meters.

It is compliant with EN/IEC61010 requirements pertaining to 600V CAT IV,1000V CATⅢ and requirements on pollution degree 2. Please read carefully this Operation Manual and pay attention to safety guidelines before operating this meter.

1.1. Safety information

1.1.1.Safety instructions

- Before operating this meter; the operator must observe all standard.

safety procedures in the two respects below :

- ✧ Safety procedures against electric shock.
- ✧ Safety procedures against unintended use.

- To ensure your personal safety, please use the test lead that accompanies the meter. Before operating this meter ensure that the test lead is flawless.

1.1.2.Safety considerations

- When the meter is used in the vicinity of the equipment that produces strong electromagnetic interference, the reading on the meter will grow unstable and even produce serious errors.
- Don't operate the meter or pen-shaped meter whose appearance is damaged.
- The safety function of the meter will become null if the meter is not properly operated.
- The meter must be operated with great care when working in the vicinity of an exposed conductor or bus line.
- The meter is prohibited from being used in the vicinity of any explosive gas, vapor or dust.
- The measurement must be made with correct input terminals and functions and within the allowable measuring range.
- To prevent the meter from being damaged, the value to be input shall not exceed the extremes allowed by each measuring range.
- When the meter has already been connected to the line being measured, the operator is prohibited from touching the input

terminal that is not in service.

- When the voltage measured exceeds 48Vdc or 30Vac (valid value),the operator shall be careful enough to avoid electric shock.
- When making measurement with a test lead, place your fingers behind its protective ring.
- When switching to another measuring range, be sure that test lead has already been taken off the measured circuit.
- For all DC functions, to prevent potential electric shock as a result of incorrect reading, please first use AC functions to check the absence of any AV voltage. Then, select DC voltage measuring range equivalent to or greater than that for AC voltage.
- Before the tests on electric resistance, diode, capacitor or continuity. The operator must cut off the power supply to the circuit to be measured, and discharge all high-voltage capacitors within the circuit to be measured.
- The electric resistance measurement or continuity test cannot be carried out in any live electrical circuit.
- Before the current measurement, the operator must first examine the protective tube of the meter Before connecting the meter to the circuit to be measured, the operator must first power off the aforesaid circuit.
- Before repairing TV sets or measuring power switching circuit, the operator must be careful enough to prevent high amplitude voltage impulse from damaging the meter.
- This meter uses 3 x 1.5V AAA batteries that must be correctly installed into the battery compartment.
- When appears, the batteries must be replaced immediately. The low level of a battery will result in incorrect reading on the meter; which is likely to bring electric shock or personal injury to the operator.
- In measurement, CAT Ⅲ voltage and CAT IV voltage shall not exceed 1000V and 600V respectively.
- The meter shall not be in service if its case (or part of its case) is dismantled.

1.1.3.Safety symbol

The safety symbols that appear on the meter's body and in this Operation Manual:

⚠	Warning, an important safety symbol. The operator must consult this Operation Manual before using the meter Unintended use may lead to the damage to the device or its components.
~	AC (alternating current)
⎓	DC (direct current)
≂	AC/DC
⏚	Ground
⧈	Double insulation protection
⏛	Fuse
CE	Compliant with European Union Directive
ϟ	High voltage warning
1000V CAT III	1000V CAT III over-voltage protection
600V CAT IV	600V CAT IV over-voltage protection

1.1.4.Maintenance practices for safety

- The operator must first pull out the test lead when the meter's case is opened or the battery cover is dismantled.
- The designated replacement parts must be used at the moment of maintenance.
- The operator must cut off all relevant power supplies before opening the meter: At the same time, the operator must avoid damage to the meter's elements by ensure that he himself doesn't carry any static.
- The meter can only be calibrated, repaired and maintained by professionals.

- When the meter's case is opened, the operator must understand the fact that the presence of some capacitance may promise the dangerous voltages even if the power supply to the meter is cut off.
- The operator should stop using and maintain the meter immediately if any abnormality has been observed on the meter. The operator must see to it that the meter cannot be in service unless it is proved conforming.
- When the meter is left idle for a long period, the operator shall remove the battery and place it in a place free from high temperature and humidity.

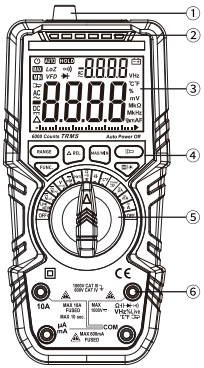
1.1.5.Input protection measures

- The meter can sustain the maximum input voltage of 1000V (DC) or 1000V (AC) at the moment of voltage measurement.
- The meter can sustain the maximum AC voltage of 1000V or equivalent voltage (valid value) when the tests on frequency electric resistance, continuity and diode are carried out.
- The protective tube (FF800mA/1000V) is used for protection purpose when μA and mA current measurements are carried out.
- The protective tube (FF11A/1000V) is used for protection purpose when A current measurements are carried out.

2. A Schematic Diagram for the Meter

This meter is a hand-held digital multi-meter with the function of displaying True RMS. it is a large-screen LCD unit with backlight and illumination light functions so that the user can easily recognize reading. It is equipped with the function of overload protection and the indicator of battery under voltage. Either for professionals, factories, schools, enthusiasts or households, it is an ideal multi-functional meter.

2.1.A Schematic Diagram for the Meter



①. Non-contact voltage detection area ②. indicator light
③.LCD screen ④. Function button ⑤. Rotary switch ⑥.input socket

2.2.Description of the symbols on the display unit

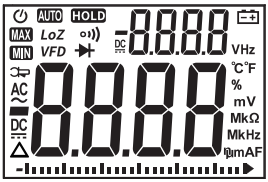


Table.1 (Symbols)

Symbol	Description
	Battery Under Voltage indicator/ Low Battery ⚠ **To avoid electric shock or personal injury as a result of incorrect reading, promptly replace the battery when the battery under voltage indicator appears.**
	Auto power off indicator
	Relative measurement indicator

▬	Negative input polarity indicator
AC	Input voltage AC
DC	Input voltage DC
MAX	Maximum measurement
MIN	Minimum measurement
	Clamp current measurement mode
	Continuity test mode
LoZ	LoZ (low impedance) voltage measurement
VFD	Low pass filter indicator
	Diode test mode
AUTO	Automatic range measurement mode
H	Data hold mode
%	Duty ratio
V、mV	V: Volt, a unit of voltage. MV: millivolts, $1x10^{-3}$ or 0.001 volts.
A、 mA、 μA	A： Ampere, the unit of current. mA： Milliampere, $1x10^{-3}$ or 0.001 ampere μA： Microampere, $1x10^{-6}$ or 0.000001 ampere
Ω、kΩ、MΩ	Ω： Ohm, the unit of electric resistance. kΩ： Kilohm, 1000 Ohm MΩ： Megaohm, 1,000,000 Ohm
Hz、kHz、MHz	Hz： Hz, the unit of frequency kHz： KHz, $1x10^{3}$ Hz MHz： MHz, $1x10^{6}$ Hz or 1000 KHz
F、mF、μF、nF	F： Farad, the unit of capacitance. mF： Millifarad， $1x10^{-3}$or 0.001 farad μF： Microfarad $1x10^{-6}$ or 0.000001 farad nF： nF, $1x10^{-9}$ or 0.000000001 farad

2.3.Description of functional keys

Key	Description of functions
RANGE	Automatic and manual range switching keys
FUNC.	Function selection switch key
△REL	Relative value measurement key
H/☀	Backlight and Data hold key
	Lighting on key
MAX/MIN	Maximum and minimum measurement key

2.4.Description of input socket

Input socket	Description
COM	All public input terminals to be measured.
Ω VHz%Live °C°F	Resistance, capacitance, diode, connectivity, voltage, frequency, duty cycle, zero live line detection (Live), positive input terminal for temperature measurement (connected to red test pen); And the positive input socket of the current clamp head in the clamp current measurement mode.
μA mA	Positive input terminal for micro ampere and milliampere measurements (up to 600mA) for AC and DC (connected to red test pen)
10A	10A positive input terminal (connected to a test lead in red).

2.5.Accessories

① Operation Manual One
② Test lead A pair
③ Type thermocouple A pair
④ Battery 1.5V AAA ×3

3.Operational guidelines

3.1.Normal operation

3.1.1.Measurement mode

The multimeter has both manual and automatic ranges. In automatic range mode, the multimeter will select the optimal range for the detected input signal, making it convenient for users to change the measurement signal without having to reselect the range. The multimeter can also be set to manual range. After the meter is turned on or converted, it defaults to automatic range mode, and the meter displays the "**AUTO**" symbol. The manual range operation for entering or exiting is as follows:

1. In automatic range mode, press the "**RANGE**" key to disable the "**AUTO**" symbol.
2. Press the "**RANGE**" button to increase the range. When the maximum range is reached, the meter will return to the minimum range.
3. Press and hold the "**RANGE**" button for 2 seconds to exit manual range mode, and the meter panel will display the "**AUTO**" symbol.

Note: There is only one range for millivolts, frequency, duty cycle, continuity, diodes, capacitance, and temperature functions.

3.1.2.Relative Value Measurement

The meter is equipped with a relative value measurement function. In this mode, the value displayed on the meter = actual value - set reference value. Follow the operations below to enter or exit the relative measurement operation:

1.Set the meter to the measurement function you want, let the probes contact the object you want to set as the reference value, and the meter displays the measured value.

2.Press "△**REL**" to store the measured value as reference value and enter the relative measurement mode, the meter displays "△".

3.Measurement, the meter will display "actual value - set reference value".

4.Press "△**REL**" again to exit the relative value measurement mode and the "△**REL**" sign fades

Note: There is no relative value measurement mode for NCV, Live, frequency, duty ratio, continuity and diode measurements.

3.1.3 Maximum/minimum values

The meter is equipped with maximum and minimum value retention functions. The operation to enter or exit this function is as follows:

1.Set the meter to the measurement function you need.

2.Press the "**MAX/MIN**" key to enter the maximum value holding mode, and the meter panel displays the "**MAX**" symbol.

3.Press the "**MAX/MIN**" button again to enter the minimum value holding mode, and the meter panel will display the "**MIN**" symbol.

4.Press and hold the "**MAX/MIN**" button for more than 2 seconds, and the meter will return to normal measurement mode.

Note: There is no relative value measurement mode for NCV, live,frequency, duty ratio, capacitance and diode measurements.

3.1.4.Hold mode

In the hold mode, the reading can be maintained on the display unit. Changing the measurement function position or pressing the key "H/☀" again to exit the hold mode.

Hold mode: entry and exit

1.Press the key "H/☀" and the reading will be held and the symbol "HOLD" will appear on the LCD screen.

2.Press the key "H/☀" again to restore the meter to its status for normal measurement.

3.1.5.Backlight & lighting

The meter is equipped with the functions of backlight and lighting so that the operator can access measurement results even if he is in a darker place. The backlight function can be enabled or disabled by the steps below :

1. Press the key "H/☀" for over 3 seconds to enable backlight.
2. Press the key "H/☀" again for over 3 seconds to manually disabled backlight; wait for 30 seconds until the backlight is automatically disabled.

The lighting function can be enabled or disabled by the steps below :

1. Press the key once to turn on the lighting.
2. Press the button again to manually turn off the lighting; Or automatically turn off the lighting after about one minute.

3.1.6.Auto power off

1.After turning on meter, the symbol will be displayed in the upper left corner of the LCD display. If there is no operation in 15 minutes, the instrument will emit "beep beep" sound and enter sleep mode.

2. After automatic shutdown, press the "**FUNC**"or **H**/☀ button or switch gears to restore the working status of the meter.

3.If press the **FUNC.** button to turn on the meter, the symbol in the upper left corner of the LCD display will disappear and the automatic shutdown function will be canceled.

3.2.Measurement guidelines

3.2.1. AC voltage and DC voltage measurement

⚠WARNING

● To avoid any electric shock and/or damage to the meter; do not attempt a voltage measurement if the voltage (valid value) is 1000V for DC current or 1000V for AC current.

● To avoid any electric shock and/or damage to the meters don't attempt to impose between any public terminal and ground any voltage whose valid value is over1000V for DC current or 1000V for AC current.

The steps for measuring AC and DC voltages are as follows:

1.Turn the rotary switch to $\tilde{\overline{V}}_{VFD}$ and press the **"FUNC."** button to switch between AC voltage or DC voltage functions.

2.Connect the black test pen and the red test pen to the **COM** input jack and $V\Omega Hz\%Live$ input jack respectively.

3.Use the test pen to measure the voltage value of the circuit to be tested at both ends (in parallel with the circuit to be tested).

4.Read the measured voltage value from the LCD display.

Note:

●In the AC voltage measurement mode, the LCD screen can simultaneously display the voltage and frequency values of the measured AC voltage source, with the main display shows the voltage value of the AC voltage source and the secondary display shows the frequency value of the AC voltage source.

●In AC voltage measurement mode, long press the "FUNC." key to enter the "VFD" low-pass filter; Internally, a specific filtering circuit

will be used to filter out high-frequency interference signals, ensuring the accuracy of measurement data! Can be applied in situations with VFD variable frequency voltage.

●The AC voltage value measured using this instrument is the true RMS (root mean square). For sine waves and other waveforms (without DC offset), such as square waves, triangular waves, and stepped waves, these measurements are accurate.

3.2.2. AC+DC voltage measurement

> **⚠ WARNING**
>
> **● To avoid any electric shock and/or damage to the meter; do not attempt a voltage measurement if the voltage (valid value) is 1000V for DC current or 1000V for AC current.**
> **● To avoid any electric shock and/or damage to the meters don't attempt to impose between any public terminal and ground any voltage whose valid value is over1000V for DC current or 1000V for AC current.**

The steps for measuring the AC+DC voltage are as follows:

1.Turn the rotary switch to V AC+DC.

2.Connect the black test pen and the red test pen to the **COM** input jack and VHz%Live °C°F input jack respectively.

3.Use a test pen to measure the voltage value of the circuit to be tested at both ends (in parallel with the circuit to be tested).

4.The measured voltage value is read by the LCD display, where the main display shows the DC voltage value and the secondary display shows the AC voltage value.

3.2.3.LoZ (low impedance) voltage measurement

> **⚠ WARNING**
>
> **● To avoid any electric shock and/or damage to the meter; do not attempt a voltage measurement if the voltage (valid value) is 1000V for DC current or 1000V for AC current.**
> **● To avoid any electric shock and/or damage to the meters don't attempt to impose between any public terminal and ground any voltage whose valid value is over1000V for DC current or 1000V for AC current.**

The steps for measuring LoZ (low impedance) voltage are as follows:

1. Switch the rotary switch to the " $\tilde{\tilde{V}}_{LoZ}$ " and press the " **FUNC.** " key to switch between AC and DC low impedance voltage measurement modes.
2. Connect the black test pen and the red test pen to the **COM** input jack and Ω VHz%Live °C°F input jack respectively.
3. Use a test pen to measure the voltage value of the circuit to be tested at both ends (in parallel with the circuit to be tested).
4. Read the measured voltage value from the LCD display.

Note: In low impedance voltage measurement mode, the input impedance is 300kΩ, and the maximum measurement time cannot exceed 1 minute.

3.2.4. AC/DC mV voltage measurement

⚠WARNING

• To avoid any electric shock and/or damage to the meter; do not attempt a voltage measurement if the voltage (valid value) is 1000V for DC current or 1000V for AC current.

• To avoid any electric shock and/or damage to the meters don't attempt to impose between any public terminal and ground any voltage whose valid value is over1000V for DC current or 1000V for AC current.

The steps for measuring the AC/DC mV voltage are as follows:

1. urn the knob to the " $\tilde{\tilde{mV}}$ " position and press the "**FUNC.**" key to switch between DC or AC voltage functions.
2. Insert the red probe into the Ω VHz%Live °C°F input socket and the black probe into the **COM** input socket to make contact with the measured circuit (parallel to the measured power supply or circuit), measure the voltage, and read the measurement result from the display screen.

Note:

• The AC voltage value measured using this instrument is the true RMS (root mean square). For sine waves and other waveforms (without DC offset), such as square waves, triangular waves, and stepped waves, measurements are accurate.

• AC/DC millivolt voltage measurement, with a maximum range of 600mV. When the probe is open, it will display a number, which is

normal. As long as the probe is short circuited, it will return to zero or contact the measured circuit, and the reading will stabilize.

3.2.5. Resistance, Continuity and Diode measurement

> **⚠ WARNING**
> **To avoid damage to instruments or tested equipment, all power sources to the tested circuit should be cut off and all high-voltage capacitors fully discharged before conducting resistance, diode, and connectivity measurements.**

Turn the rotary switch to Ω and press the "**FUNC.**" key to switch resistance, connectivity, and diode measurements.

1) The steps for measuring resistance are as follows:

1.Connect the black test pen and the red test pen to the **COM** input jack and VΩ input jack respectively.

2.Use a test pen to measure the resistance value of the circuit being tested at the other two ends.

3.Read the measured resistance value from the LCD display.

Note:

●The resistance value measured on a circuit usually differs from the rated value of the resistance.

●When measuring low resistance, in order to measure accurately, please first short-circuit the two probes and read the resistance value of the short circuit on the probe. After measuring the measured resistance, subtract the resistance value.

●At 60MΩ gear, it takes a few seconds for the reading to stabilize. This is normal for high resistance measurements.

●When the instrument is open circuit, the display will display "OL", indicating that the measured value is outside the range.

2) The steps for measuring continuity are as follows:

1. Connect the black test pen and the red test pen to the **COM** input jack and VΩ input jack respectively.

2. Measure the resistance of the circuit being tested at both ends of the test pen. If the resistance of the circuit being tested is not greater than about 30Ω, the induction indicator light (green light) will light up and the buzzer will emit a continuous sound. If the measured resistance is greater than 30Ω but less than 600 Ω, the induction indicator light (red light) will light up.

3) The operation steps for measuring diodes are as follows:

1. Connect the black test pen and the red test pen to the **COM** input jack and VHz%Live input jack respectively.
2. Connect the black test pen and the red test pen to the negative and positive terminals of the diode being tested, respectively.
3.The instrument will display the forward bias value of the measured diode. If the polarity of the test pen is reversed, the instrument will display "**OL**". In the circuit, a normal diode should still generate a forward voltage drop of 0.5V to 0.8V; But the reading of reverse bias will depend on the change in resistance values of other channels between the two probes.

3.2.6. Capacitance measurement

⚠ WARNING

● To avoid the meter or the measured equipment from damage, do not attempt a capacitance measurement unless the operator has already cut off all power sources for the circuit to be measured and fully discharged all high-voltage capacitors. Use the DC voltage position to determine that all capacitors have been discharged.

The steps for measuring capacitance are as follows:

1. Turn the rotary switch to ⊣⊢.
2. Connect the test leads in black and in red to **COM** input socket and VHz%Live input socket respectively.
3. Use another two ends of the test lead to measure the capacitance of the capacitor to be measured, and capture the measured value on LCD screen.

Note :

● The measurement of a large capacitance requires a given period of stabilization of reading.

● To avoid damage to the meter, the measurement of a capacitor with polarities requires much attention to its polarity.

3.2.7. Clamp shaped AC/DC current measurement

The steps for measuring clamp AC/DC current are as follows:

1. Switch the rotary switch to the clamp current measurement gear, and press the "**FUNC.**" key to switch between clamp DC current and

clamp AC current measurements.

2. Press the "**RANGE**" button to manually select the corresponding measurement gear.

3. Insert the corresponding red plug of the clamp into the meter input socket, and the black plug into the instrument **COM** input socket. Hold the clamp head trigger to open the clamp, and clamp a wire of the tested circuit into the clamp. The meter will display the measured current value.

Note :

In the clamp AC current mode, the instrument LCD screen displays both the measured current value and frequency value simultaneously; Long press the "FUNC." button for more than 2 seconds to activate the VFD measurement function.

3.2.8. Frequency/duty ratio measurement

⚠ WARNING

• To avoid any electric shock and/or damage to the meter, do not attempt a frequency measurement if the voltage is over 250V for DC current or AC current(valid value).

The steps for measuring frequency/duty ratio are as follows:

1. Turn the rotary switch to the position **Hz%**.
2. Connect the test leads in black and in red to **COM** input socket and input socket respectively.
3. Use another two ends of the test lead to measure the frequency of the circuit to be measured.
4. Read the measured frequency on LCD screen.
5. Press "**FUNC.**" to switch the display duty ratio.

3.2.9. AC and DC Current measurement

⚠ WARNING

• Do not attempt a measurement on the current in a circuit, if when the voltage between the open-circuit voltage and the ground is over 1000V. If the fuse is blown at the moment of measurement, you are likely to damage the meter or get yourself hurt.

• To avoid any damage to the meter or equipment to be measured, do not attempt a current measurement unless you have examined the meter's protective tube. In attempting a

measurement, you should use the correct input sockets, function positions and measuring ranges. When a test lead is inserted into the current input socket, do not put the other end of the test lead in parallel connection with any circuit.

The steps for measuring AC and DC current are as follows:

1. Turn the rotary switch to the appropriate position.
2. Connect the test lead in black to **COM** input socket. Connect the test lead in red to a **mA** input socket when the measured current is less than **600mA** , connect the test lead in red to a **10A** input socket when the measured current is 600mA~10A.
3. Disconnection of the circuit to be measured Connect the test lead in black to the end of disconnected circuit (the voltage is lower) and connect the test lead in red to the end of the disconnected circuit (voltage is higher).
4. Connect the power to the circuit and capture the displayed reading. If the display unit only shows "**OL**" , it means the input is over the selected measuring range. At this moment, turn the rotary switch to a higher measuring range.

3.2.10. NCV and Live line test

Turn the rotary switch to Live/NCV and press the "**FUNC.**" key to switch between NCV and zero live wire testing functions.

1)The steps for test **NCV** are as follows:

Place the top of the meter approach the conductor. If the meter detects the AC voltage, the indicators for signal density (high, medium and low) will be on in accordance with the detected density, while the beeper will sounds alarms at different frequencies.

Note :

- **Voltage may still remain in the absence of any indication. The operator shall not rely on non-contact voltage detector to check the presence of voltage. The detection operation may be affected by various factors, including socket design, insulation thickness and type.**
- **When the voltage is input into the meter's input terminal, the voltage sensor LED may be on as a result of induced voltage.**
- **External sources of interference (like flashlight and motor) may trigger non-contact voltage detection.**

2)The steps for test live line are as follows:

1. Connect the red test pen to the Ω VHz%Live °C°F input socket.
2. Insert a single pen into the power socket L or near a live wire. If the meter detects AC voltage, it will light up the induced voltage signal strength indicator light (high, medium, and low) based on the detected signal strength, and the buzzer will emit an alarm sound of different intensities.

3.2.11. Temperature measurement

The steps for temperature measurement are as follows:

1. Turn the rotary switch to the **℃/℉** position.
2. Insert the red plug of the thermocouple into the Ω VHz%Live °C°F input socket, and the black plug into the **COM** input socket.
3. Place the temperature sensing end of the thermocouple close to the surface of the temperature body to be measured.
4. Once the reading is stable, the temperature value can be directly read from the display screen.
5. Short press the "**FUNC.**" key to switch between **℃** and **℉**.

Note :

The maximum measurement temperature of the randomly delivered K-type thermocouple is 250 ℃ and the instantaneous measurement can reach 300 ℃.

4. Technical parameters

4.1. Overall parameters

- Operating environment :
  - ✧ CAT IV 600V and CAT III 1000V, Pollution level: 2 .
  - ✧ Altitude < 2000 m .
  - ✧ Working temperature & humidity: 18~28℃ (The requirements will not be considered when temperature is less than 10 ℃ and relative humidity is below 80%).
  - ✧ Storage temperature & humidity: -10~60℃ (batteries shall be removed when RH is below 70%) .
- Coefficient of temperature: 0.1×accuracy /℃ (<18℃ or >28℃) .
- Allowable max voltage between terminal to be measured and ground: 1000V DC or 1000V AC RMS.
- Fuse protection : mA position: fuse (FF800mA/1000V) ; A position: fuse (FF11A/1000V) .

- Rotation rate: about 3 times/sec.
- Display: 6000 counts displayed on LCD screen. Automatically display the symbol for unit in accordance with measurement function position.
- Over-range indication: the LCD screen will display "**OL**".
- Battery low voltage indication: " ⊟+ " will be displayed when the battery voltage is below the normal operating voltage.
- Input polarity indication: " — " is automatically displayed.
- Power supply: 3 x 1.5V AAA batteries.
- External dimensions: 194mm(L)×90 mm(W)×56mm(H).
- Weight: about 380g (battery included).

4.2. Precision indicator

Accuracy: ±(%reading + digit). Accuracy is applicable for one year after calibration.

Reference conditions: Ambient temperature 18°C to 28°C, relative humidity not greater than 80%.

4.2.1.DC voltage

Range	Resolution	Accuracy
600mV	0.1mV	± (0.5% reading +3 digits) (600mV range only in mV range)
6V	1mV	
60V	10mV	
600V	100mV	
1000V	1V	

Input impedance: 10MΩ.

Maximal input voltage: 1000V DC or 1000V AC RMS.

4.2.2.AC voltage

Range	Resolution	Accuracy
600mV	0.1mV	± (0.8% reading +5 digits) (600mV range only in mV range)
6V	1mV	
60V	10mV	
600V	100mV	± (1.0% reading +5 digits)
1000V	1V	

Input impedance: 10MΩ.

Maximal input voltage: 1000V DC or 1000V AC RMS.

Frequency response: 40Hz-1kHz True RMS.

4.2.3.Frequency and Duty Ratio

Range	Resolution	Accuracy
10Hz	0.001Hz	± (0.5% reading +5 digits)
100Hz	0.01Hz	
1kHz	0.1Hz	
10kHz	0.001kHz	
100kHz	0.01kHz	
1MHz	0.1kHz	
10MHz	0.001MHz	
1%~99%	0.1%	± (3% reading + 2 digits)

Input voltage range : 200mV-10V AC RMS.
Overload protection : 1000V DC or 1000V AC RMS.

4.2.4.Resistance

Range	Resolution	Accuracy
600Ω	0.1Ω	±(1.0% reading +3 digits)
6kΩ	1Ω	
60kΩ	10Ω	
600kΩ	100Ω	
6MΩ	1kΩ	
60MΩ	10kΩ	±(2% reading +3 digits)

Overload protection : 1000V DC or 1000V AC RMS.
Open-circuit voltage: about 1V.

4.2.5.Diode

Functions	Range	Resolution	Testing conditions
	3V	0.001V	Forward DC current : about 1mA ; Open-circuit voltage : about 3.2V. The display unit shows the approximate value of the diode's forward voltage drop.

Overload protection : 1000V DC or 1000V AC RMS.

4.2.6.Continuity

Functions	Range	Resolution	Description	Testing conditions
	600Ω	0.1Ω	When the built-in beeper sounds and the accompanying green indicator is on, the measured resistance shall not be over 30Ω , The red indicator will be on when the resistance is 40Ω-60Ω.>600 Ω display OL.	Open-circuit voltage: about 1V

Overload protection : 1000V DC or 1000V AC RMS.

4.2.7.Capacitance

Range	Resolution	Accuracy
60nF	0.01nF	± (4.0% reading +5 digits)
600nF	0.1nF	
6μF	1nF	
60μF	10nF	
600μF	100nF	
6mF	1μF	
100mF	0.01mF	± (5.0% reading +3 digits)

Overload protection : 1000V DC or 1000V AC RMS.

4.2.8. DC current

Range	Resolution	Accuracy
600μA	0.1μA	± (0.8% reading +3 digits)
6mA	0.001mA	
60mA	0.01mA	
600mA	0.1mA	
10.00A	0.01A	± (1.2% reading +3 digits)

Overload protection: fuse for mA range (FF800mA/1000V); fuse for A

range (FF11A/1000V) .

Maximal input current : μA position : 6mA DC/AC RMS,
mA position : 600mA DC/AC RMS,
A position: 10A DC/AC RMS.

When the measured current is over 5A, the duration of continuous measurement shall not be over 15 seconds. The current measurement shall be carried out 1 minute after the completion of previous measurement.

4.2.9.AC current

Range	Resolution	Accuracy
600μA	0.1μA	± (1.0% reading +3 digits)
6mA	0.001mA	
60mA	0.01mA	
600mA	0.1mA	
10A	0.01A	± (1.5% reading +3 digits)

Overload protection: fuse for mA range (FF800mA/1000V); fuse for A range (FF11A/1000V).

Maximal input current : μA position : 6mA DC/AC RMS,
mA position : 600mA DC/AC RMS,
A position: 10A DC/AC RMS.

When the measured current is over 5A, the duration of continuous measurement shall not be over 15 seconds. The current measurement shall be carried out 1 minute after the completion of previous measurement.

Frequency response: 40Hz-1kHz, True RMS.

4.2.10.Clamp AC current

Range	Resolution	Accuracy	Note
60A	0.01A	± (2.5% reading +5 digits)	10mV/A
600A	0.1A		1mV/A

Minimum input value of clamp AC current: 0.01A RMS.
Maximum input value of clamp AC current: 600A RMS.
Frequency response: 40Hz~1kHz.

4.2.11.Clamp DC current

Range	Resolution	Accuracy	Note
60A	0.01A	± (3% reading +10 digits)	10mV/A
600A	0.1A		1mV/A

Minimum input value of clamp AC current: 0.01A RMS.
Maximum input value of clamp AC current: 600A RMS.

4.2.12.Temperature

Range	Resolution	Accuracy
-40℃~1000℃	1℃	± (1.0% reading +2 digits)
-40℉~1832℉	1℉	

Overload protection : 1000V DC or 1000V AC RMS.

5.Meter maintenance

This section provides the basic information on maintenance, including the descriptions about replacement of protective tubes and batteries.

Do not attempt the meter maintenance unless you are experienced in maintenance and have read the information on calibration, performance test and maintenance.

5.1.General maintenance

⚠WARNING

● To avoid any electric shock or damage to the meters do not attempt to clean the inside of the meter .You must remove the line connecting a test lead to input signals, before opening the case or battery cover.

You must regularly use damp cloth and a small quantity of detergent to clean the meter's shell. Don't attempt the use of any abrasive or chemical solvent.

The dirty or damp input socket may affect reading.

Steps for cleaning input sockets :

①Shut down the meter and pull all test leads out of the input socket.

②Clean up all dirty substances on sockets.

③Use a new cotton ball with a detergent or lubricant to clean each

socket because lubricant can prevent the socket vulnerable to dampness form pollution.

5.2.Battery & fuse replacement

⚠ WARNING

●To avoid any electric shock or personal injury as a result of incorrect reading, replace batteries once the symbol "⊟" appear on the display unit.

● Only the designated fuse (800mA/1000V,11A/1000V quick-acting fuse) can be used.

●To avoid any electric shock or personal injury ,don't attempt to open the battery cover to replace batteries, unless you have already powered off the device and carried out an examination to ensure that the test lead has been disconnected from the circuit to be measured.

Batteries must be replaced by the following steps:

1. Cut off the power to the meter.
2. Pull all test leads out of the input socket.
3. Use a screw driver to unscrew the bolts that are used to fix battery cover.
4. Take off the battery cover. Remove the old batteries and replace new batteries.
5. Remount the battery cover and fix a bolt.

Fuse must be replaced by the following steps:

1. Cut off the power to the meter.
2. Pull all test leads out of the input socket.
3. Use a screw driver to unscrew the bolts that are used to fix battery cover.
4. Take off the battery cover.
5. Remove the damaged fuses and replace a new fuse.
6. Use a screw driver to unscrew the bolts that are used to fix battery cover.