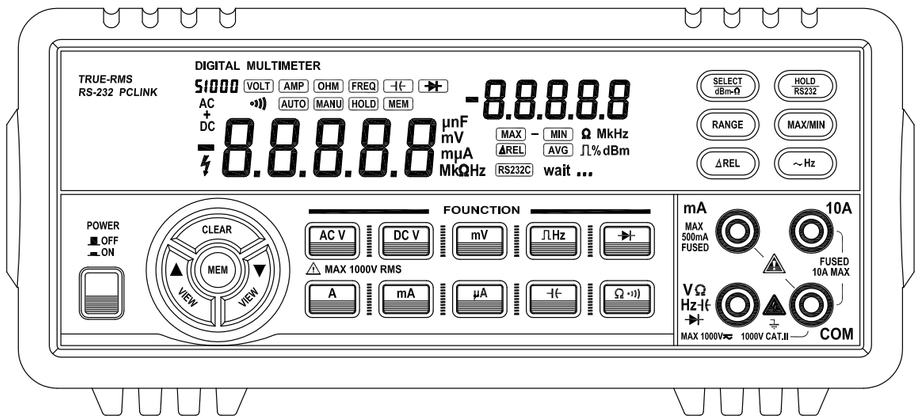
53000 COUNTS HIGH ACCURACY DIGITAL MULTIMETER

OPERATING INSTRUCTION



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True RMS Bench Model Multimeter
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Chapter 1

Meter Safety Standards

This style of digital multimeter is designed and manufactured according to the safety requirements set out by the IEC1010-1 standards for electronic test instruments and the hand-hold digital multimeters. Its design and manufacture is strictly based on the provisions in the 1000V CAT II of IEC1010-1 and the Stipulation of 2-Pollution Grade.

The meter conforms to the European Union's following requirements:89/336/EEC(EMC Electromagnetic Compatibility),73/23/EEC(LVD Low Voltage Protection)and 93/68/EEC(CE Mark).

⚠ WARNING

- Must use power socket with reliable earth line, or should connect earth line to the shell (there is a peg on the back panel for connecting earth).
- Before use of the meter firstly check up if there is any crack on the outer shell or if it lacks any plastic part, and check up whether the testing line is damaged or has any exposed metal. The meter can be used only if no any insulating problem be found.
- Carefully read the operating methods and safety prompts in this manual. Using it not based on the methods specified in this manual may cause the meter damaged.
- Non-normal meter must not be used. It should be sent for repairing.
- The meter must not be used in an environment with combustible gases, steam or dust pollution.
- It should be careful to work when measuring votage higher than 30Vac(effective value)or 50Vdc for such voltage having the risk of shock. Avoid the body directly touching ground or any metal substance in which there may be ground
  potential during measuring. The body should be kept insulated from ground with dry insulating shoes, insulating pads or insulating clothes.
- When performing measurement with a test probe your fingers should be put behind a finger-protector.

- Must not try to measure a voltage higher than 1000VAC or 1000VDC,the meter may be damaged and the operator's safety may be threatened if the limit for voltage measurement be exceeded.
- Must not make any voltage measurement when the testing line being inserting into the current hole.
- Repair and calibration of the meter must be carried out by experienced professionals, unprofessionals should not repair and calibrate the meter by themselves.

Limited Guarantee and the Liability Scope

This company will undertake repairs freely for any quality problem of the meter which if should be found within 18 months from the date at which it was bought, but which not including replacement of fuse as well as any damage caused by negligence, wrong use, pollution, change of circuit and non-normal use.
For maintenance beyond the 18-month guarantee period, the company will charge a certain repair fee and materials cost.

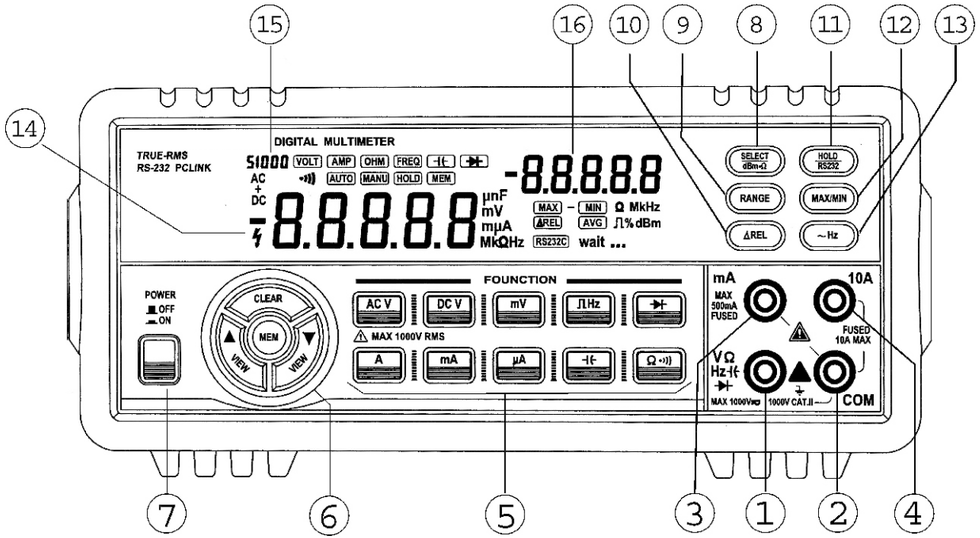
Chapter 2

Characteristics

- 53000 counts measurement
- ACV and DCV measurements reach up to 1000V.
- DC measurement accuracy reaches up to 0.03%.
- 0.01 Ω resistance resolution and 1μV voltage resolution.
- Linear frequency measurement, logic frequency/duty ratio measurement.
- Capacitance measurement from 0.01nf to 5000μF.
- AC/DC true RMS measurement.
- DBm measurement
- Maximum value/minimum value measurement, relative/average value measurement.
- Color VFD double display function
- All operations by buttons
- Up to 30 full screen data memory
- RS-232C infrared interface.
- Display, record and graphics software of computer.
- Overload protection.
- Sound alarm for wrong current measurement.

Explanation on Front Panel

The front panel is shown as in Figure 2-1,
explanation being as follows:



(1) VΩHz end
It is the input end for all measurement functions except for current measurement, connected with a red meter probe.

(2) COM end
It is the negative input end for all measurements, connected with a black meter probe.

(3) μA/mA end
It is the positive end for measurement of μA or mA current, connected with a red meter probe.

(4) A end
It is the positive input end for measurement of 0.5A-10A current, connected with a red meter probe.

(5) Function switching buttons
Used for selecting measurement functions such as voltage, current, resistance and Capacitance.

(6) Memory operation buttons
Used for data storage, redisplay, deletion.

(7) POWER switch
Used for putting on or off the operating power for the meter.

(8) SELECT key
When setting a measurement function, the meter will enter its first measurement mode, while pressing the SELECT key it is possible to select the second or the third measurement mode. However, there is only one for the diode and Capacitance measurements. During dBm measurement, pressing SELECT key will alter the virtual resistance value for calculatig dBm.

(9) RANGE key
For various kinds of measurements it is used manually to select range. Under the automatic range state (AUTO displaying), it will enter manual range state(MANUAL displaying) with a press on RANGE, after that the range will be changed with a press on RANGE while the small digits on the left lower corner indicating the actual range. When the RANGE key being released after pressing for two seconds the meter will return back to the automatic state. When performing logic frequency measurement and diode measurement pressing RANGE will be void.

(10) RELΔkey
By pressing RELΔ to enter the relative measurement state, the meter will remember th value measured at the time when pressing the key(it is called the initial value), and after that the value displayed in the meter will be equivalent to the present value – the initial value. By pressing the key again the relative measurement state will be exited. Pressing the key will be void during the frequency、diode、capacitor measurements.

(11) HOLD key
Used to maintain the measurement data unchanging, by pressing the key again it will resume the measurement. When releasing the key after pressing it for two seconds, the meter will enter the state connecting with the RS-232C interface of computer while sending measurement information to computer. When releasing the HOLD key after pressing it for two seconds again, it will stop to send data to the RS-232C interface.

(12) MAX/MIN key
Press MAX/MIN key to enter the record state for the maximum and minimum value and simultaneously display the maximum value. By pressing this key again it will be possible to display the minimum value, the maximum value-minimum value or average value. When releasing the key after pressing it for two seconds, the maximum and minimum record state will be exited. Pressing this key will be void during frequency、diode、capacitor measurements.

(13) ~Hz key
During the voltage or current measurements, by pressing ~Hz key the meter will enter the linear frequency measurement state. At this time what being measured is the frequency of voltage or current. By pressing this key again it will exit the linear frequency measurement state.

(14) The first display zone
Used for displaying the measuring results and various symbols.

(15) The range indicator
Used for indicating the full range value of thie range in manual range such as 5,50,500 and 1000,etc.

(16) The second display zone
Used for displaying the measuring results and various symbols.

Explanation on Back Panel

The back panel is shown as in figure 2-2, explanation being as follows:

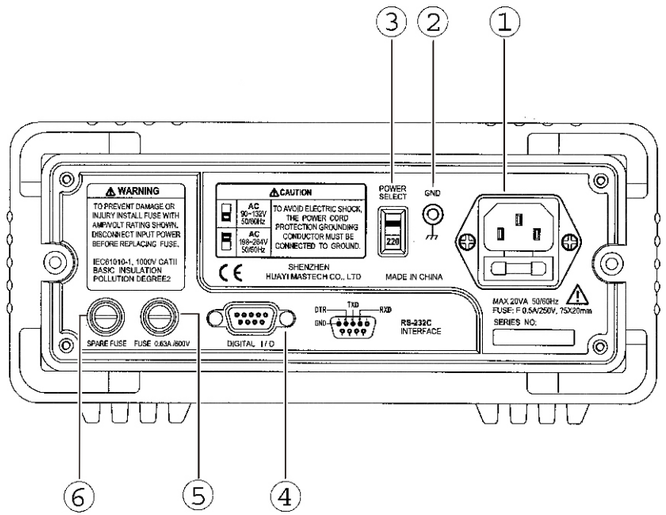


Figure 2—2

(1) Power socket
The ground line in power socket is connected to the shell of the meter. The power fuse(0.5A/250V) is in power socket.

(2) Earth pag
If the ground line in power socket is not conneted to earth reliably, should connect the pag to earth.

(3) Power selection switch
Be used to select 110V or 220V power supply. Before leaving factory it is turned on the position of 220V.

(4) RS232 interface
Be used to connect the meter to a computer for sending data. Depending on infrared to send data, it is safe for computer.

(5) uA/mA FUSE
It is 0.63A/500V fuse, by rotating it's cover 90°, it will spring out.

(6) Spare fuse
As a spare of 0.63A/500V fuse

Function Descriptions

Along with the conventional measurement functions this meter also possesses some special functions which being described as follows:

- True effective value (TRUE RMS) measurement: all the measurement values of this meter on the AC voltage and AC current are true effective values, which distinguishing this meter from the low-grade meters which only can measure the AC average value.
- dBm measurement: dBm measurement is a value calculated and displayed under the current AC voltage, with a virtual resistance R obtained through SELECT key and according to the following formula: $10\ log_{10}(1000V^2/R)$
  It is the AC power expressed in the logarithmic form.
- DC+AC measurement: when measuring voltage or current having both the AC and the DC components, in case of selecting the DC+AC measurement mode, this meter will perform measurements on both DC and AC components respectively and then calculate and display the results according to the following formula: $\sqrt{DC^2+AC^2}$
  DC+AC measurements reflect the general effective values generated jointly by both the DC and AC components.
- Automatic and manual ranges: When turning on the meter's power switch the meter defaults the automatic range state (AUTO displaying), and simultaneously it will automatically select the proper range according to the measured electric parameters. If OL being displayed under automatic range, it indicates the measured value exceeding the meter's maximum range. Pressing the RANGE key under the automatic range the meter will enter the manual range(MANUAL displaying), then pressing the RANGE key again it will be possible to select the required range. The indicator for range will display the maximum value of this range. If OL displaying under the manual range, it indicates the measured value exceeding the selected range. Press the RANGE key under the manual range for two seconds and then release it, the meter will go back to the automatic range state.

- Linear frequency measurement: Pressing the~z key when the meter performing measurements on AC voltage or current as well as on mixture signal of AC and DC, it will be capable to measure the frequency of the AC component. However it has a certain requirements on the amplitude of the AC component.
- Logic impulse duty ratio measurement: logic impulse duty ratio refers to: (high level width/impulse cycle)×100%
- Diode measurement: during diode measurement the meter is indicating to the forward voltage drop of the diode
- Relative measurement: during relative measurement the meter remembers internally the instantaneously measured value (called initial value)when pressing the REL Δ key, and the later displaying value being:

  present value – initial value

  The relative measurement value reflects the changes of the measured value. It also can be used to take off the errors brought about by lead resistance during measuring low resistance. Due to subtraction calculation, negative value may appear during measuring AC current, resistance.
- Maximum/minimum/average value measurement: by pressing MAX/MIN keys the meter can enter the maximum/minimum value record state, and it will continuously update the maximum/minimum values based on the new measurement results. Pressing the MAX/MIN key can diplay the maximum value, the minimum value, the maximum value-the minimum value and average value in cycles. After exiting the MAX/MIN measurement state the recorded maximum value/minimum values will disappear. Average value is that the sum of last ten ties measurements is divided by ten.
- Data memory function: this instrument can storage full screen data anytime. It can memorize up to 30 full screen data, can redisplay the screen data and delete them by pressing button MEM or VIEW or CLEAR.
- High voltage indicator: when measuring a voltage and the voltage reaches 37V, symbol (ϟ) lights.
- RS-232C interface: press the HOLD key for two seconds and then release it, the meter will open the infrared interface for sending the measured data and status to the RS-232C interface of computer. Equipped with record and graphic software (options)the mete can display, record and describe the measured electric quantity on computer. As the data transmission between the meter and computer is depending on light coupling, so measurement of high voltage will not affect the safety of computer.

Chapter 3 Operation Methods

ACV/dBm Measurement

The voltage measurement range is of AC 0.5V~1000V and the measurement method is as follows:

1. Turn on the power switch and press the **ACV** button.
2. Insert the red and black testing lines into **VΩHz** end and **COM** end respectively.
3. Select the **ACV** or **dBm** measurement mode with the **SELECT** key.
4. Connect the meter to the two ends of the measured voltage with the red and black probes.
5. Read the meter's data from the display screen. When **OL** displaying on the meter, it indicates the measured voltage exceeding the meter's range and it is necessary to remove both the red and black probes from the measured circuit immediately.
6. By pressing the **RANGE** key it is possible to select range manually. Indicator of range displays range. While displaying OL during manual range measurement, it is necessary to select a larger range. When OL displaying under the maximum range, it indicates the voltage exceeding 1000V,so it is necessary to remove both the red and black probes from the measured circuit immediately. Press SELECT key for two seconds to stop dBm display.
7. By pressing SELECT KEY, the meter displays dBm value on the secound display zone, press **SELECT** key again to select the resistance value needed for calculating dBm,there are 4, 8,16,32,50,75, 93,110,125,135,150,200,250,300,500,600, 800 ,900,1000 and 1200 ohms being possible to be selected respectively. Press SELECT key for two seconds to stop dbm display.

Notes: in case of probe hanging in the air, the voltage inducted by the testing line may cause unstable readings on the display screen, but that will not affect the accuracy of measurement.

> ⚠ **WARNING**
>
> **Not try to measure a voltage higher then 1000 volt**

DCV/DCV + ACV Measurement

The voltage measurement range is of AC 0.5V~1000V and the method is as follows:

1. Turn on the power switch and press the **DCV** button .
2. Insert the red testing line into the **VΩHz** end and the black testing line into the **COM** end.
3. Press **SELECT** key to select **DCV** or **DCV + ACV** measurement mode.
4. When performing DCV measurement, connect the red probe to the positive polarity of the measured voltage and the black probe to the negative polarity of the measured voltage. While performing DCV + ACV measurement, it will be done by connecting the red probe and the black probe into the two ends of the measured voltage.
5. Read the measured value from the display screen. If OL displaying on the meter, it indicates the measured voltage exceeding the range of the meter and it is necessary to remove the both red and black probes from the measured circuit immediately.
6. When performing DCV measurement, by pressing the **RANGE** key it is possible to select range manually. The indicator of range indicates the range value. If OL displaying during manual range measurement, it is necessary to select a larger range. If OL displaying under the maximum range, it indicates the voltage exceeding 1000V and it is necessary to remove the both red and black probes from the measured circuit immediately.When performing DCV + ACV measurement automatic range will be held and it is null to press the **RANGE** key.

Notes: in case of probe hanging in the air, the voltage inducted by the testing line may cause unstable readings on the display screen, but that will not affect the accuracy of measurement. When performing DCV + ACV measurement it will be relatively slow to refresh the measured data as it needs time to switch AC and DC measurements and to calculate RMS.

> ⚠ **WARNING**
>
> **Not try to measure a voltage higher then 1000 volt**

DCmV/ACmV/DCmV+ACmV measurement

The DC voltage measurement range is of 1mV ~ 500mV but AC voltage is of 5mV ~ 500mV， the methods is as follows:

1. Turn on the power switch and press **mV** key.
2. Insert the red testing line into the **VΩHz** end and the black testing line into the **COM** end.
3. Press the **SELECT** key to select **DCmV** or **AcmV** or **DCmV + AcmV** measurement modes.
4. When performing DCmV measurement, connect the red probe to the positive polarity of the measured voltage and the black probe to its negative polarity. While performing ACmV or DCmV+ ACmV measurement, it will be done by connecting the red probe and the black probe into the two ends of the measured voltage.
5. Read the measured value from the display screen. If OL displaying on the meter, it indicates the measured voltage exceeding the range of the meter and it is necessary to remove both the red and black probes from the measured circuit immediately.
6. When performing DCmV or ACmV measurement, by pressing the **RANGE** key it is possible to select range manually. The indicator of range indicates the range value. If OL displaying during manual range measurement, it is necessary to select a larger range. If OL displaying under the maximum range, it is necessary to remove both the red and black probes from the measured circuit immediately. When performing DCmV + ACmV measurement automatic range will be held and it is void to press the **RANGE** key.

Notes: In case of probe hanging in the air, the voltage inducted by the testing line may cause unstable readings on the display screen, but that will not affect the accuracy of measurement.When performing DCmV + ACmV measurement it will be relatively slow to refresh the measured data as it needs time to switch AC and DC measurements and to calculate RMS.

Logic Frequency/Duty Ratio Measuremeat

The frequency range is of 5Hz~2MHz(Vp 2.5~5V),while the duty ratio measurement range being of 10%~90%.And the measurement methods are as follows:

1. Turn on the power switch and press **⎍Hz** button.
2. Insert the red testing line into the **VΩHz** end and the black testing line into the **COM** end.
3. Connect the red testing line to high logic level, the black one to low logic level.
4. Read the measured value from the display screen. If the frequency of the measured signal is lower or higher than the meter's measurement range, the reading will be displayed as zero. If the amplitude of signal is too low or the low level is larger than 1 volt, the reading will also displayed as zero.
5. This measurement is of automatic range, it is null to press the **RANGE** key.
6. By pressing **SELECT** key, the meter measures Duty Ratio and display it on the second display zone. Press SELECT key again to stop Duty Ratio display.

Diode Measurement

The measurement range of diode is of 0~3.3V.
The measurement methods are as follows:

1. Turn on the power switch and press the ⊣◀ button.
2. Insert the red testing line into the **VΩHz** end and the black testing line into the **COM** end.
3. Connect the red probe to the positive polarity of the diode and the black probe to its negative polarity, while the display screen will display the forward voltage drop.
4. Connect the black probe to the positive polarity of the diode and the red probe to its negative polarity, if OL displaying on the display screen, it indicates the backward resistance of the diode being normal, while OL not displaying, it indicates that the diode is backward leaking.

Notes: In case of performing diode test on circuit board, it is necessary firstly to turn off the power of the circuit board and then perform the measurement. As there may be other parallel circuits, so the displayed value of test is not surely the results listed in items 3 and 4.

Resistance/continuity Test

The measurement range of resistance is of 0.01Ω~50MΩ and the measurement methods are as follows:

1. Turn on the power switch and press **Ω** ◦ıı) button.
2. Insert the red and black testing lines into the **VΩH** input end and the **COM** input end respectively.
3. Press the **SELECT** key to select resistance (**Ω**) or the continuity(◦ıı)) modes
4. For the resistance measurement, connect the red and black probes to the two ends of resistor and read the resistance value from the display screen. If OL displaying, it indicates the resistor is larger than 50MΩ. As for the continuity measurement, connect the red and black probes to the two measured points respectively. In case of the resistance between the two points being less than about 50Ω~60Ω, the buzzer will sound while the display screen displaying the value of resistance. If OL displaying, it indicates the resistance between the two points is larger than 500Ω.
5. When the resistance measurement mode being implemented, it is possible to select range by pressing the RANGE key. The indicator of range indicates the value of range. If OL displaying during manual range measurement, it is necessary to select a larger range. Under the continuity measurement mode it is null to press the **RANGE** key.

Notes: In case of performing resistance or continuity test on circuit board, it is necessary firstly to turn off the power of the circuit board and then perform the measurement. As there may be other parallel circuits, so the displayed value of test is not surely the actual value of the resistor.

Capacitance Measurement

The measurement range of capacitance is of
10PF~5000μF and the measurement methods are as follows:

1.Turn on the power switch and press ⊣⊢ button.

2.Insert the red and black testing lines into the **VΩHz** input end and the **COM** input end respectively.

3.If exists voltage in the capacitor, connect the two ends of the capacitor for a short time to discharge.

4.Connect the red and black probes to the two ends of the capacitor, if the measured capacitor is heteropolar, it is necessary to connect the red probe to the positive polarity of the capacitor and the black probe to its negative polarity.

5.Read the capacitance from the display screen. If capacitance value >5300μF, the meter will display OL, while capacitance value <10PF,it will display zero.

6.It is possible to select range manually by pressing the **RANGE** key. The indicator of range indicates the value of range. If OL displaying during manual range measurement, it is necessary to select a larger range.If it has been the largest range, which means capacitance value >5300μF.

Notes: When performing measurement on 500μF—5300μF capacitor, in order to ensure measurement accuracy the meter takes a relative long time to discharge capacitor, so it is relatively slow in refreshing the measured value. In addition,not to perform Capacitance measurement on a circuit board on which there are other parallel devices, for that may leads to very large error.

DC μA/AC μA /DC μA+ AC μA Measurement

The measurement range of DC current is 0.01μA～5000μA but AC is of 5μA～5000μA, and the measurement methods are as follows:

1.Turn on the power switch and press μA button.

2.Insert the red testing line into the **mA/μA** input end and the black testing line into the **COM** input end.

3.Press the **SELECT** key to select the **DcμA, AcμA** or the **DcμA + AcμA** measurement modes.

4.Turn off the power of the measured circuit, connect the red and black probes to the measured circuit in serial way and then turn on the power of the measured circuit.

5.Read the measured value from the display screen. If it displays as positive during the DC measurement, it means the current is flowing into the meter from the red testing line, while it displaying as negative, it means the current is flowing into the meter from the black testing line. If it displays as OL, it means current exceeding range.

6.During measurement of **DC μA or AcμA**、 it is possible to select range manually by pressing the RANGE key. Under the DCμA + AcμA measurement mode, automatic range is held and it is null to press the **RANGE** key.

Notes: Under the DCμA + ACμA measurement mode, it is relatively slow to refresh the measured data as it is needs time to switch AC and DC measurements and to calculate RMS.

⚠ WARNING

Estimate the current before measurement, not to exceed 0.63A current of the fuse

DC mA/AC mA /DC mA + AC mA Measurements

The measurement range of DC current is 1μA~50mA but AC is of 5mA~500mA,
and the measurement methods are as follows:

1. Turn on the power switch and press the mA button.
2. Insert the red testing line into the **mA/μA** input end and the black testing line into the COM input end.
3. Press the **SELECT** key to select the **DC mA**, **AC mA** or the **DC mA + AC mA** measurement modes.
4. Turn off the power of the measured circuit, connect the red and black probes to the measured circuit in a serial way and then turn on the power of the measured circuit again.
5. Read the measured value from the display screen. If it displays as positive during DC measurement, it means the current is flowing into the meter from the red testing line, while it displays as negative, it means the current is flowing into the meter from the black testing line. If it displays OL, indicating current exceeding range.
6. When performing **DC mA or AC mA** measurement, it is possible to select range manually by pressing the RANGE key. Under the **DC mA + AC mA** measurement mode the automatic range is held and it is null to press the **RANGE** key.

Notes: Under the **DC mA + AC mA** measurement mode, it is relatively slow to refresh the measured data as it needs time to switch **AC** and **DC** measurements and to calculate RMS.

⚠ WARNING

Estimate the current before measurement, not to exceed 0.63A current of the fuse .

DC Ampere/AC Ampere/DC Ampere + AC Ampere Measurement

The measurement range of DC current is 0.1mA~10A but AC is of 0.5A~10A,
and the measurement methods are as follows:

1. Turn on the power switch and press A button.
2. Insert the red testing line into the A input end and the black testing line into the **COM** input end.
3. Press the **SELECT** key to select the **DC A, AC A** or **DC A + AC A** measurement modes.
4. Turn off the power of the measured circuit, connect the red and black probes to the measured circuit in a serial way and then turn on the power of the measured circuit again.
5. Read the measured value from the display screen. During the **DC** measurement, if it displays as positive, it means the current is flowing into the meter from the red testing line, while it displays as negative, it means the current is flowing into the meter from the black testing line. If it displays OL, it indicates current exceeding range.
6. When performing **DC A or AC A** measurement, it is possible to select range manually by pressing the Range key. Under the **DC A + AC A** measurement mode, automatic range is held and it is null to press the **RANGE** key.

Notes: Under the DC A + AC A measurement mode, it is relatively slow to refresh the measured data as it is needs time to switch AC and DC measurements and to calculate RMS.

⚠ WARNING

Estimate the current before measurement, not to exceed 11A current of the fuse.

Linear Frequency Measurement

The measurement range is of 5Hz~200KHz and the measurement methods are as follows:

1. When performing voltage or current measurement, in case of measured value being AC or including AC elements, it is possible to measure and display the alternating frequency on the second display zone, by pressing the **~Hz** key. However it has a certain requirements for the amplitude of alternating signal and the meter has varied requirements for signal amplitude when it is in different ranges, for information of which please refer to Table 3—1.
2. When measuring linear frequency, the range is automatic, it is null to press the **RANGE** key.
3. Press **~Hz** key again to exit linear frequency

Table 3-1

Range	Sensibility(sine wave)
mV	4mV
5V	0.5V
50V	4V
500V	40V
1000V	400V
μA	40μA
μA	4mA
A	0.4A

Relative Value Measurement

Except for frequency, duty ratio, diode and capacitance measurements, all other measurements can employ relative measurement. Press **RELΔ** key to enter relative measurement and the meter will record the initial value when pressing the key. And the second display zone value is:

Displayed value = present measurement value — Initial value

Press **RELΔ**again to exit relative measurement. Changes of measurement value may be found in relative measurement which also can be used for the small resistance measurements, for example, when performing resistance measurement, connect the red testing line and the black testing line in short, press the **RELΔ**key to record the values of resistance (resistance of both the red and black lines), and after that performing resistance measurement again the lead resistance will have been taken off from the second display zone value.

Notes: Duty to subtraction, the relative value is sometime a negative one.

Maximum Value/Minimum Value/Maximum Value-Minimum Value average value measurement

Except for frequency, diode, capacitance measurements, by pressing the **MAX/MIN** key the meter will enter the maximum value, minimum value and average value record state and disply the maximum value on the second display zone. The meter measures the present value and continuously judges if it is necessary to update the maximum or minimum value. Pressing the **MAX/MIN** key again it is possible to select displaying the minimum value, the maximum value — minimum value or the average value. Under the maximum and minimum value record state, press the **MAX/MIN** key for two seconds and then release it, the meter will exit the MAX/MIN record state.

Data Hold

By pressing the **HOLD** key it is possible to hold the measurement value and the state at the moment of pressing the **HOLD** key. While pressing the key again data measurement will be resumed.

Data memory and redisplay

When measuring it is possible to storage full screen messages in the meter by pressing **MEM** key, a memory zone number (1~30) displays for a while. By pressing **VIEW** key it is possible to redisplay the memorized screen data orderly(show memory zone number first then the screen message). When redisplaying, pressing **CLEAR** key for two seconds will delete the shown message solely , and yet pressing **MEM** key will return to measurement state, When measuring, pressing **CLEAR** key for two seconds will delete all the 30 screen message.

Connected to Computer RS-232C Interface

Pressing the **HOLD** key for two seconds and then releasing it, the meter will begin to send the measured data and state to computer while the VFD display screen displaying RS-232C. Then it will be able to record、analyze、draw and print all the measurement on computer as long as you insert one end of the RS-232C cable into the socket on the back panel of the meter and another end into the computer RS-232C interface and run the record and graphics software (options).And press the **HOLD** key for two seconds and then release it again, the meter will stop to send data to computer,symbol RS-232C on the VFD display screen will go out.

Chapter 4 Technological Specifications

General Features

- Voltage between the measurement end and ground is of 1000V AC/DC. 1000V CAT II, 2th pollution grade.
- 53000 counts, automatic/manual range, basic sampling rate 2.5 t/s.
- When measuring mV, logic frequency, diode, resistance and capacitance, the maximum overload protection voltage will be 250V(effective value),while measuring of μA/mA the protection current being 0.64A,and measuring of A, the protection current being 12.5A.
- Over range indication OL.
- Fuse being 0.63A/500V(μA/mA end) and 12.5A/500V (A end) and 0.5A/250V(Power fuse).
- Infrared coupling RS-232C interface.
- Operating temperature: 5℃~30℃ (relative humidity 0~80%)
  31℃~41℃ (relative humidity 0~50%)
- Storage temperature: -20℃~60℃ (relative humidity <= 80%)
- Altitude: operation less than 2000m,
  storage less than 10000m
- Volume: 350mm X 240mm X 100mm
- Weight: 2500g

Range and Accuracy

The below-listed accuracies under different ranges refer to those which are guaranteed by the meter within one-year calibration, with normal use under the operating temperature of 18℃-28℃ and relative humidity less than 80%.The presentation for accuracy is: ± (**% reading digits + number of lower digits)

• AC Voltage/DC Voltage + AC Voltage

Range	Resolution	Accuracy		
		40Hz-1KHz	1KHz-10KHz	10KHz-20KHz
50mV	0.001mV	±(0.5% + 40)	±(1% + 40)	±(2.5% + 40)
500mV	0.01mV	±(0.5% + 40)	±(1% + 40)	±(2.5% + 40)
5V	0.1mV	±(0.5% + 40)	±(1% + 40)	±(2.5% + 40)
50V	1mV	±(0.5% + 40)	±(1% + 40)	±(2.5% + 40)
500V	10mV	±(0.5% + 40)	±(1% + 40)	unspecified
1000V	0.1V	±(0.5% + 40)	unspecified	unspecified

Notes: above accuracies can be guaranteed within 10%-100% of the full range.

• DC Voltage

Range	Resolution	Accuracy
50mV	0.001mV	±(0.03% + 10)
500mV	0.01mV	±(0.03% + 6)
5V	0.1mV	±(0.03% + 6)
50V	1mV	±(0.03% + 6)
500V	10mV	±(0.03% + 6)
1000V	0.1V	±(0.03% + 6)

Notes: above accuracies can be guaranteed within the full range

• AC Current/DC Current + AC Current

Range	Resolution	Accuracy			Voltage Drop
		40Hz~1KHz	1KHz~10KHz	10KHz~20KHz	
500μA	**0.01μA**	±(0.75% + 20)	±(1% + 20)	±(2% + 20)	102μV/μA
5000μA	**0.1μA**	±(0.75% + 10)	±(1% + 10)	±(2% + 10)	
50mA	**1μA**	±(0.75% + 20)	±(1% + 20)	±(2% + 20)	1.5mV/mA
500mA	**10μA**	±(0.75% + 10)	±(1% + 10)	±(2% + 10)	
5A	**0.1mA**	±(0.75% + 20)	±(1.5% + 20)	±(5% + 20)	30mV/A
10A	**1mA**	±(0.75% + 10)	±(1.5% + 10)	unspecified	

Notes: above accuracies can be guaranteed within 10%-100% of the full range

• DC Current

Range	Resolution	Accuracy	Voltage Drop
500μA	0.01μA	±(0.15% + 15)	102μV/μA
5000μA	0.1μA	±(0.15% + 10)	
50mA	1μA	±(0.15% + 10)	1.5mV/mA
500mA	10μA	±(0.15% + 10)	
5A	0.1mA	±(0.5% + 10)	30mV/A
10A	1mA	±(0.5% + 10)	

Notes: above accuracies can be guaranteed within the full range

• Resistance

Range	Resolution	Accuracy
500Ω	0.01Ω	±(0.1% + 10)
5KΩ	0.1Ω	±(0.1% + 5)
50KΩ	1Ω	±(0.1% + 5)
500KΩ	10Ω	±(0.1% + 5)
5MΩ	100Ω	±(0.1% + 10)
50MΩ	1KΩ	±(0.5% + 10)

Notes: above accuracies can be guaranteed within the full range

• Capacitance

Range	Resolution	Accuracy
50nF	0.01nF	±(1% + 15)
500nF	0.1nF	±(1% + 15)
5μF	1nF	±(1% + 10)
50μF	10nF	±(1% + 10)
500μF	0.1μF	±(2% + 10)
5000μF	1μF	±(2% + 10)

Notes: above accuracies for film capacitor or better can be guaranteed within the full range.

• Diode

Range	Resolution	Accuracy
3.3V	0.1mV	±(1% + 5)

Notes: the test current is about 0.7mA

• Logic Frequency

Frequency Range	Sensitivity	Accuracy
5Hz~2MHz	Vp 2~5V square wave	±(0.006% + 4)

• Linear Frequency

Frequency Range	Voltage/Current Range	Sensitivity	Voltage Drop
5Hz~200KHz (sine wave)	mV	4mV	±(0.006%+4)
	5V	0.5V	
	50V	4V	
	500V	40V	
	1000V	400V	
	μA	40μA	
	mA	4mA	
	A	0.4A	

Notes: Low voltage or low frequency would lower the accuracy.

• Duty Ratio

Frequency Range	Duty Ratio Range	Resolution	Accuracy
5Hz~500KHz	10%~90%	0.01%	±(10%)

Chapter 5 Maintenance

Replacement of Fuse

It must take off the red and black testing lines from the measured circuit and take out the power line from the meter before replacement of fuse. It should only use fuse of the same model and the same electric specifications.
The meter has three fuses.
The power fuse is 0.5A/250V in the power socket.
The uA/mA fuse is 0.63A/500V on the back panel of the meter(a spare fuse is nearby).
The Amper fuse is 12.5A/500V in the shell (to replace it, take off back cover firstly, then take off back panel and the shell, you can see 12.5A fuse on the board).

Notes: generally, fuses will not be blown under the normal use of the meter. In case of blowing it is necessary first to find out the reasons for the blowing and then take an account on the use of the meter. Generally, blowing may attribute to:

- Perform voltage measurement when in the position of current.
- Current exceeds range.

Meter Calibration

There is no any component which can be used for calibration in the meter, calibration of the meter is implemented depending on the built-in software in the meter. Professionals and accuracy-even-higher standard signal sources are required for calibration of the meter. Users possessing such conditions may contact us for calibration methods when there is a need on calibration meter, while those who having not such conditions can contact us for calibration matters.

Others

- In case of any default being found this meter must not be used continuously.
- When the meter needs repair, please send it to experienced professionals or the appointed maintenance department for repairing.
- It should use soft cloth but not organic solvents which have corrosive and dissolving effect on the shell of meter to clean the meter, and it should guard against water dropping into the meter.

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