User Manual

Professional Digital Multimeter



Made in China

CEF© RoHS 🕸 🗵

1. Security Information

⚠ Warming People who use this meter should pay special attention to it, because the improper use might cause electric shock or damage to the meter. Please follow the actual safety rules and safety measures as specified in the manual.

To fully use the function of this meter and ensure its safety operation, please read and follow its usage methods in the specification carefully.

This meter matched the technical requirement of digital multimeter GB/T 13978-92 and the safety requirement of electronic measuring meter GB4793.1-1995 (IEC-61010-1. It belongs to secondary pollution and its over-voltage standard is CAT II 600V.

Please follow the safe operation guide and ensure safe use for this meter Proper use and maintenance for meter will give you a satisfied service.

- 1. Users must follow the standard safety rules when using it: - Need some universal protection to avoid electric shock. - To avoid misuse the meter.
- 2. Check if there is any damage on this meter or not in the process of transportation when received it. 3. Check if there is any damage on this meter or not when preserved, loaded and delivered it
- 4. The test lead must be in a good condition. Check whether there is any damage on its
- insulation or not and if meter's metal wire is exposed or not before using it. 5. Using the test lead provided by meter can guarantee the use of meter safety. If needed, you
- must use the same or similar pen to replace it.

3.2.8.2 Using Hz setting

999.9Hz

9.999kHz

99.99kHz

999.9kHz

9.999MHz

Range

10 - 95%

3.2.9 Duty Cycle

3.2.10 DC Current

- 2. Don't overtake the indicating value of protection extent of everymeasuring range when
- 3. Don't touch the top of test lead (the metal part) when linked meter with measuring circuit. 4. When testing, if the voltage tested is over 60V DC or 30V AC (RMS), please keep your
- 1. The correct function and measuring range must be guaranteed when using it.
- fingers behind the test lead protector.

0.001kHz

0.01kHz

Overload protection: 250V DC or AC (RMS) -Measuring signal: Vpp3V AC signal

Overload protection: µA and mA level: Protective tube FF600mA/700V A level: Protective

tube F10A/700V.When the measuring current is above 5A, the continuous measuring time

must below 10 seconds. After that, the current test must be stopped for 1 minute.

0.1µA

1µA

10µA

Measuring range Resolution ratio

- i. When the measuring terminal voltage is over 600V DC or 600V AC, please stop testing
- from the measuring circuit.
- link meter with voltage source.
- Don't test capacitance before the capacitor is fully discharged.
- completely clasped in place.

- 1 It can be used for dangerous live conductors

meter displays the user should change battery right now.

- 0. Don't use the meter under the explosive gas, steam or dust environment.

- $\overline{\hspace{0.1in}}$ In accordance with the IEC-61010-1 standard over-voltage (installation) level II,pollution level 2,CAT II means the level of pulse withstand voltage protection provided.

- Before turning the switch to change the testing function, the test lead should be removed
- When use current,resistance,capacitor,diode and circuit breaker,user should avoid to

- (Matched EC(EU) standard.

- Please do not attempt to open the meter bottom shell to adjust or repair the meter, such operation only can be performed by technician who fully understands the instrument and
- the electric shock hazard.
- . In order to avoid the wrong readout which might cause possible electric shock when the

- Do not measure resistance, capacitance, diodes and lines when the line is energized
- 1. If there is any abnormality or malfunction in the meter, user should stop using it.
- 3. Don't preserve or use meter in the condition of direct sunlight, high temperature, high

- Attention (For important safety information, which you can refer to the specification)

- . Before opening the meter bottom shell or battery cover, meter pen should be removed

- . Multimeter should not be used unless the meter bottom shell and the battery cover are

- Double insulation protection. (II Level)

4. Use a damp cloth and a mild detergent to clean meter, but don't use abrasives or solvents

5. When meter is not in use, the meter power shall be turned off and the meter range switch

6. If meter is idle for a long time, meter battery should be removed in case of causing damage

- backlight, which is easy to read for users the range switch and one-hand operation is easy for use to test, it also has the overload protection function and low battery indication function.lt is an ideal multi-functional meter for professionals, factories, schools, meter-lov-
- ers and families. This multimeter is applicable for AC-current, DC-current, AC-voltage, DC-voltage, frequen-
- $\hbox{\it cy,} \hbox{\it duty-cycle,} \hbox{\it resistance,} \hbox{\it capacitance measurement, wire test, and diode test.}$

2.1Component Name

- 1. NCV induction field Flashlight lamp 3. LCD
- 6. Function range switch
- 8, "COM"Input

. " 🚏 "Flashlight buttor

function will work again.

4.7 NCV(Non-contact voltage detection)



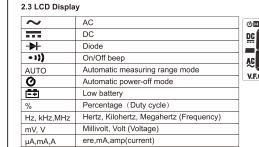
- This multimeter is a portable, professional measuring meter with a LCD display, and a
- This meter has a function of reading retention.
- This meter has non-contact detection (NCV) .AC voltage function. The meter' AC-current and AC-voltage test readout is true and valid. This meter has automatic shutdown function.
- 4. "SELECT/V.F.C"Function Selector 5. "HOLD/ 🚏 "Data-hold key
- 9. "V/Ω/A/mA/-▶-/ ፡፡፡ /-**----**/ / Hz"Inpu 10. "HZ%"Key-press



2.2 Switch, Button and Input Jack Description

- SELECT/ V.F.C PUSH-BUTTON: used for measuring function switching. HOLD/ PUSH-BUTTON: used for measuring data hold, when press it in more than 2 seconds, the backlight will turn on. Again press it in more than 2 seconds to turn off.
 - HZ/% PUSH-BUTTON: used for frequency and duty cycle switching. SELECT/ V.F.C PUSH-BUTTON: used for measuring function switching.
 - PUSH-BUTTON: used for turning off or on flashlight. OFF POSITION: used for turn off the power.
 - VΩμA,mA Hz%→ → → J-JACK: voltage, resistance, current μA and mA, frequency, duty cycle, diode, line switching, capacitor input terminals. COM JACK: Public terminal.

A JACK: 10A Current input terminal



Nano, Micro-farad, Milli-farad (Capacitor) Ohm, Kilo-ohm, Meg-ohm (Resistance) Ω, kΩ, ΜΩVariable frequency measurement prompt

Data Hold

between 1 to 50. These deviation readings are normal. They do not influence the accuracy of the multimeter which is used for testing alternating current in the specified measuring . True RMS requires meter input signal to reach a certain level for being measured. Therefore, the measuring range of AC voltage and current is specified between 2 % ~ 100 % of the full measuring range.

4.4.In order to guarantee the accuracy of AC measurement, the input signal must be the

- AC voltage: more than 13mV

Accuracy: \pm (a% rdg +digits) , Warranty for one year (Operating temperature: 23 ± 5 $^{\circ}$ Relative humidity: $^{\circ}$ 75%)

ative numidity: 5%</th <th>(0)</th> <th></th>	(0)	
Range	Resolution	Accuracy
60mV*	0.01mV	±(1.0% rdg + 3 digits)
600mV**	0.1mV	±(1.0% rdg + 3 digits)
6V	0.001V	±(0.5% rdg + 5 digits)
60V	0.01V	
600V	0.1V	

- Input impedance: *Measuring range≥100MΩ、**Measuring range≥1GΩ、All other input impedance of measuring range is $10M\Omega$ (*/**The measuring range opening circuit might show unstable figures on the LCD screen,but it will be stable after connecting loading≤1 word) Maximum input voltage: 600V DC

	3.2.3 AC voltage			
AC voltage measurement				
	Range	Resolution	Accuracy	
	60mV*	0.01mV	±(1.2% rdg + 3 digits)	
	600mV**	0.1mV	±(1.2% rdg + 3digits)	
	6V	0.001V	±(1.2% rdg + 5 digits)	
	60V	0.01V	±(1.2% rdg+ 5 digits)	

 Input impedance: All other input impedance of measuring range is 10MΩ (*/**The measuring range opening circuit might show unstable figures on the LCD screen,but it will be stable after connecting loading≤1 word) Display true RMS, frequency response: 45~1KHz

rtange	resolution	Accuracy
600Ω	0.1Ω	
6kΩ	0.001kΩ	
60kΩ	0.01kΩ	±(0.8% rdg + 5 digits)
600kΩ	0.1kΩ	
6ΜΩ	0.001MkΩ	
60ΜΩ	0.1ΜΩ	±(1.5% rdg + 5digits)

		Range	Resolution	Accuracy
		9.999nF	0.001nF	Only for reference
		99.99nF	0.01nF	
		999.9nF	0.1nF	
		9.999µF	0.001µF	±(3.0% rdg + 3digits)
		99.99µF	0.01µF	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
		999.9µF	0.1µF	
		9.999mF	0.001mF	
_	- 1			+(4 0% rda + 5digits)

Overload protection: 250V DC or AC (RMS)

(V.F.C 45~400Hz) Guaranteeing the range of accuracy: 5%~100%measuring range, Short circuit is allowed<It can reach 3.0 when the remaining reading of 10 base words and AC crest factor is at full value >(Apart from 600V measuring range it is 1.5 when measuring range changed is at full value) Maximum input voltage: 600V AC (RMS)

Range	Resolution	Accuracy
600Ω	0.1Ω	
6kΩ	0.001kΩ	
60kΩ	0.01kΩ	±(0.8% rdg + 5 digits)
600kΩ	0.1kΩ	
6ΜΩ	0.001MkΩ	
60ΜΩ	0.1ΜΩ	±(1.5% rdg + 5digits)

Overload protection: 250V DC or AC (RMS)

	Range	Resolution	Accuracy
	9.999nF	0.001nF	Only for reference
	99.99nF	0.01nF	
7	999.9nF	0.1nF	
1	9.999µF	0.001µF	±(3.0% rdg + 3digits)
1	99.99µF	0.01µF	
	999.9µF	0.1µF	
1	9.999mF	0.001mF	
-			±(4.0% rda + 5diaits)

600V 0.1V $\pm (1.5\% \text{ rdg} + 5 \text{ digits})$ 99.99mF 0.01mF $\pm (4.0\% \text{ rdg} + 5 \text{ digits})$

Range Resolution Function O.001V Shows the diode forward voltage value approximately The forward DC current is about 1mA The reverse DC voltage is about 3V Overload protection: 250V DC or AC (RMS) 3.2.7 Circuit on-off test

If the circuit resistance tested is below 30Ω , the meter with a

•ij) 0. 1Ω If the circuit resistance lescond is served buzzer will make a sound to indicate. Open-circuit voltage: about 1.2V Overload protection: 250V DC or AC (RMS)

Range Resolution Function

3.2.6 Diode test

3.2.8 Frequency

3.2.8.1 Using V setting or current setting: Measuring range Resolution ratio 0.01Hz 0.1Hz 600Hz $\pm (2.0\% \text{ rdg} + 5 \text{ digits})$ 0.001kHz 6kHz 10kHz 0.01kHz

- Testing range: 10Hz ~ 10kHz - Input voltage range: ≥ 0.2V AC (RMS) (With the increase of the measured frequency, the input voltage should increase as well)

Overload protection: µA and mA level: Protective tube FF600mA/700V A level: Protective

When the measuring current is above 5A, the continuous measuring time must below 10 seconds. After that, the current test must be stopped for 1 minute.

±(2.0% rdg + 5 digits)

±(1.0% rdg + 5 digits)

±(2.0% rdg + 5 digits)

±(1.5% rdg + 5digits)

±(3.0% rdg + 5 digits)

Frequency range: 50 ~ 60Hz

4.1 Reading-holding

1. In the process of meas . Press the "HOLD" key again, users can remove the reading-holding mode.

1. Whatever setting users want to operate from this meter,after turn on the meter,if users want to use flashlight, just press " " key, then flashlight will light.

V.F.C measurement mode will be cancel.

the function of resistance, diode and Continuity repeatedly.

2. Press the " 🖁 " key again,users can cancel the flashlight.

. In the condition of AC mode,if press "SELECT/ V.F.C" key for over 2 seconds,meter screen will switch to V.F.C mode. Meanwhile, the meter screen will display V.F.C prompt which can measure the variable frequency voltage reliably. If again press "SELECT/ V.F.C" for over 2 seconds, the meter screen will show "Exit V.F.C measurement mode" and the prompt from

. When testing DC or AC voltage mV,pressing"SELECT/V.F.C"button can switch to DC

. When testing current,pressing "SELECT/ V.F.C"button can switch to test DC current or AC

4. When test resistance, diode and line-on/off, pressing "SELECT/ V.F.C" button can switch to

orange test lead.

meter close to the conductor. Third, when test voltage which is above 110 Vac (RMS), and the meter is close to the conductor, the induction voltage of meter with an alarm buzzer will make beep. 1. Even if there is no sign for the meter, the voltage may still exist,. Don't rely on non-contact

voltage detector to determine whether the wire can generate voltage or not. The detection

operation may be influenced by the electrical outlet design, insulation thickness and other

1. First,the meter rotary switch have to turn to the NCV mode. Second, then put the top of

4.5 Backlight
Press "HOLD/" "button for over 2 seconds, meter will turn backlight on or off .When turn

1. If there is no any operation in any 15 minutes after power-on, the meter will go into

3. When turn the meter power on pressing "SELECT/V.F.C" button the meter with a buzze

will be canceled. And after power-off, then restart power-on, the automatic power-off

sleeping mode and turn the power off automatically so as to save power.

2. After automatic shutdown, press any key, the meter will restart working.

backlight source on, it will turn off after 30 seconds automatically.

2. When the input terminals of the meter input voltage or the interference sources of the external environment influence the meter(such as flashlight, motor and so forth), it may trigger non-contact voltage detection by a mistake because of the existence of induction

test lead with the COM input socket and V input socket respectively, and use the two ends

of test lead to test the pending circuit voltage value. (In parallel with the pending

circuit). The voltage value tested can be read by the meter LCD. When test the DC voltage.

the meter screen can simultaneously display the voltage polarity which is connected by the

1. The rotating switch must turn to" Y "Setting, connecting the black test lead and the orange

4.9 AC voltage test1.

The rotating switch must turn to" V "level,connecting the black test lead and the orange test lead with the COM input socket and V input socket respectively,and use the two ends of test lead to test the pending circuit voltage value. (In parallel with the pending

The rotating switch must turn to "setting, connecting the black test lead and the orange". test pen with the COM input socket and V input socket respectively, and use the two ends

read by the meter LCD. 4.11 Line-on/off continuity test . The rotating switch must turn to " "setting, pressing SELECT/ V.F.C button can switch to power-on/off test mode.Connecting the black test lead and the orange test lead with the COM input socket and input socket respectively.When use the two ends of test lead to test

circuit),The voltage value tested can be read by the meter LCD.

to diode test mode. Connecting the black test lead and the orange test lead with the COM input socket and Ω input socket respectively. Using the two ends of test lead to test the two ends of diode tested, the meter will display the forward decrease voltage.

4.14 Frequency and duty cycle test

meter buzzer may make a beep continuously.

1. The rotating switch must turn to" - It "setting connecting the black test lead and the orange test lead with the COM input socket and 1 input socket respectively. Using the two ends of test lead to test the pending capacitance value, users can read the value from LCD

. The rotating switch must turn to"Hz/%"setting,connecting the black test lead and the

orange test lead with the COM input socket and Hz input socket respectively. Using the

two ends of the test lead to test the pending frequency value, users can read the value from

the circuit tested, and transferring the rotary switch to the appropriate setting (uA, mA or A),finally pressing SELECT/ V.F.C button to turn to AC current or DC current and

4.15 AC and DC current test

3. Specifications

5. Display: LCD.

17.Size: 147×71×45mm.

3.2 Technical index

1. Automatic measuring range.

2 Full measuring range overload protection

. Operational height: Maximum 2000m.

10. Unit display: Function and battery unit display

11.Automatic power-off time: 15minutes.

12.Operational power: 1.5Vx3 AAA battery.

8. Weight: About 190g (excluding batteries).

3.2.1TRMS and zero input characteristics

the traditional average value response method.

6. Maximum display number: 5999.

8. Over-range display: '0L' or '-0L'.

3. Maximum voltage allowed at the measuring end.: 600V DC or 600AC (RMS)

5.Operational temperature and humidity: $0{\sim}40$ C/32 ${\sim}104$ F 、 45%-80%RH.

. As for the measurement of non-sinusoidal signals, the TRMS method has less error than

2. True RMS meter can accurately measure the non-sinusoidal wave signal, but if it's on the

AC function mode or in the condition of no input signal measured(For example, in the input

terminal short circuit or in the ac voltage mode), clamp table may show a readout of

Turning the power of the circuit tested off,then discharging all high voltage capacitance on

meter screen just display "OL",this means the input value exceeds the measuring range

16.Storage temperature and humidity: -20 $^{\sim}60$ °C/-4 $^{\sim}$ 140 °F $_{\circ}$ 45%-80%RH.

7. Polarity indication: Self-indicating, '-' means Negative polarity.

9. Sampling time: The meter figures show about 0.4 seconds

13.Battery under-voltage indication: LCD shows = symbol.

14. Temperature coefficient: Less than 0.1 x Accuracy / C.

3.1 Review

connecting the black test lead with the COM input socket.If the current tested is below 600mA.connecting the orange test lead with the mA input socket. Or if the current tested is between 600mA and 10A, connecting the orange test lead with the 10A input socket. 2.Turning the power of the circuit tested off,connecting the black test lead with one end of the circuit-off(its voltage is higher than normal condition) and connecting the orange test

selected. The rotating switch is supposed to be much higher testing range. 5. Maintenance 5.1 Replacing battery

he pending circuit resistance and power-on/off,if the resistance tested is below 50,the To avoid shock hazard,users should remove pen from the testing circuit before opening . The rotating switch must turn to" 😜 "setting,pressing SELECT/ V.F.C button can switch

the power of the circuit tested on, users can see the readings from the meter screen. If

the battery cover of the meter.

1. If the meter screen displays " symbol, it indicates the meter must replace its battery. . Rotate the fastening screws of the battery cover and remove it.

The polarity of meter battery can't be installed reversely.

B. Replace the powered-off battery.

Jsers must replace the same or similar level test lead when replace it.Besides,the test lead must keep intact and its level is:1000V 10A.

Please install the battery cover by simulating its original look.

5.2 Replacing the meter pen

If the insulation of test lead is damaged and the metal wire is exposed, users must replace it.