

**User's manual for VC99 3 6/7 DMM**

**1.SUMMARY**

This digital multimeter is a steady performance, battery-driven 3 6/7 digital multimeter. It uses the LCD with 23mm-high figure to make the reading clear and make operation more convenient.

The digital multimeter has the function of measuring DCV, ACV, DCA, ACA, resistance, capacitance, frequency, temperature, duty cycle, transistor and diode, continuity performance test .The meter can provide functions including analog bar and unit symbol display, data holding, relative value measuring, maximal/minimal value measuring, auto/manual range switching (RANGE), auto power off and warning functions .it adopts double integral A/D converter as its core. It is an ideal tool for labs, factories and radio-technology.

**2.SAFTY NOTES:**

The instrument is designed according to IEC1010 standard (safety standard issued by International Electro technical Committee). Please read the following before operation.

- 1-1.Check the connection and insulation of test leads to avoid electric shock.
- 1-2.Do not input a limited voltage higher than DC 1000V or AC 750V when measuring ranges.
- 1-3.When measuring voltage higher than DC 60V, AC 40V, please be careful.
- 1-4. Select correct function and range to avoid fault operation.
- 1-5.Please move the test leads away from test points when switching the function.
- 1-6.Please don't input voltage value when measuring current.
- 1-7.Please don't modify the circuit.
- 1-8.Introduction for safety symbol:

“” exists high voltage; “” GND “” dual insulation “” must refer to manual “” Low battery.

**3. SPECIFICATION**

**1. General features**

- 1-1. Displaying: LCD;
- 1-2.Max display: 6000(3 6/7) digits automatic polarity, unit symbol and 61 section analog display;

- 1-3. Measurement method: double integral A/D conversion;
- 1-4. Sampling rate: approx.3 times/sec.
- 1-5. Over-range display: “OL” displayed in the highest digit.
- 1-6. Low battery display: “”
- 1-7. Working environment: (0~40)℃, relative humidity: <80%;
- 1-8.Store environment: (-10~40)℃, relative humidity: <80%;
- 1-9.Power supply: 2pcs 1.5V battery (“AAA”7# battery);
- 1-10. Dimension: 185×93×35mm (length\*width\*height);
- 1-11. Weight: approx..290g ((including battery);
- 1-12.Accessories: test leads, user manual, temperature probe, holster, gift box, and 2\*1.5V battery.

**2. TECHNICAL FEATURES**

2-1. Accuracy: ± (a% × reading data + digits), environment temperature at (23±5) ℃, relative humidity<75%, One year guarantee since production date.

2-2.DC Voltage (DCV)

Range	Accuracy	Resolution
600mV	±(0.5%+3)	0.1mV
6V		1mV
60V		10mV
600V		100mV
1000V	±(0.8%+3)	1V

Input impedance: approx. 10MΩ

Overload protection: 1000V DC or 750V AC.

2-3.AC Voltage (ACV)

Range	Accuracy	Resolution
6V	±(0.8%+5)	1mV
60V		10mV
600V		100mV
750V		1V

Input impedance: approx. 10MΩ

Overload protection: 1000V DC or 750V AC.

Frequency response: (40~200) Hz under 750V ,other range:(40~400) Hz.

Sine wave RMS(Average value response).

2-4.DC Current (DCA)

Range	Accuracy	Resolution
600uA	±(1.0%+3)	0.1μA
6000uA		1μA
60mA		10μA
600mA		100μA
6A	±(2.0%+5)	1mA

20A	10mA
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MAX measurement voltage drop: full range mA :300mV, A:100mV。

Max input current: 20A (within 15 seconds)

Over load protection: 500mA/ 250V and 13A/250V

fast molten fuse.

2-5.AC Current (ACA)

Range	Accuracy	Resolution
600uA	±(1.2%+5)	0.1μA
6000uA		1μA
40mA		10μA
600mA		100μA
6A	±(2.0%+15)	1mA
20A		10mA

MAX measurement voltage drop: full range mA :400mV, A:200mV。

Max input current: 20A (within 15 seconds)

Over load protection: 500mA/ 250V and 13A/250V

fast molten fuse.

Frequency response: : 20A range:40~100Hz,other range:40~400Hz。

2-6.Resistance (Ω)

Range	Accuracy	Resolution
600Ω	±(0.8%+5)	0.1Ω
6kΩ		1Ω
60kΩ		10Ω
600kΩ		100Ω
6MΩ	±(0.8%+3)	1kΩ
60MΩ		±(1.2%+5)

Open circuit voltage: 600mV

Over load protection: 250V DC or AC peak value;

**NOTE:** At range 600 Ω, short-circuit the test leads to measure the wire resistance and then subtracts it from the real measurement. Or press “REL” to clear the wire resistance and read the value directly.

2-7.CAPACITANCE (C)

RANGE	ACCURACY	RESOLUTION
40nF	±(2.5%+6)	10pF
400nF		100pF
4μF	±(2.5%+5)	1nF
40μF		10nF
400μF		100nF
2000μF	±(5.0%+8)	1uF

Overload protection :250V DC or AC peak value.

## 2-8.REQUENCY ( F )

RANGE	ACCURACY	RESOLUTION
10Hz	±(0.5%+4)	0.01Hz
100Hz		0.1Hz
1000Hz		1Hz
10kHz		10Hz
100kHz		100Hz
1MHz		1kHz
60MHz		10kHz

Input sensitivity:0.7V

Over load protection: 250V DC or AC peak value;

## 2-9.Transistor(hFE)

RANGE	VALUE	TESTING CONDITION
NPN OR PNP	0~1000	Basic current approx.15μA, Vce approx.4.5V

## 2-10. Diode and continuity performance test

range	VALUE	TESTING CONDITION
	Forward voltage drop of diode	Forward DCA is approx. 0.5mA, the backward voltage is approx 1.5V
	Buzzer makes a long sound while resistance is less than (50±10)Ω	Open circuit voltage is approx. 0.5V

Over load protection: 250V DC or AC peak value;

CAUTION: DO NOT INPUT VOLTAGE AT THIS RANGE!

## 2-10. TEMPERATURE ( °C )

RANGE	VALUE	RESOLUTION
-40℃-1000℃	<400℃ ±(0.8%+4) ≥400℃ ±(1.5%+15)	1℃
0F-1832°F	<750°F ±(0.8%+5) ≥750°F ±(1.5%+15)	°F

Sensor: TP01(K type thermocouple)

CAUTION: DO NOT INPUT VOLTAGE AT THIS RANGE!

## 4. OPERATION

### 4-1. Panel description

1. LCD: display the measuring value and unit.

2.Function key:

2-1.HOLD key: press it, the presently measured value is held on LCD and **HOLD** symbol displays. Press it again, **HOLD** symbol disappears, and the meter is exited the holding mode.

2-2. REL key: press it, reading clear, turn into relative value measurement states, "REL"symbol displays, Press it again,"REL" symbol disappears, and the meter is exited the relative mode.

2-3. Hz/DUTY key: When measuring the AC Voltage (Current), press it, it will switch

Frequency/duty cycle/Voltage(Current), When measuring the Frequency ,it will switch frequency/duty cycle (1~99%)。

2-4."DC/AC"key: switch DC and AC work mode..

2-5.RANGE key: select auto range or manual range mode, Auto range is the original states, it will display "AUTO" symbol , press it change to manual range .Press it more than 2 second , it will return to auto range states

2-6.MAX/MIN key :press it, turn into MAX mode, it will hold the max value of measuring, press it again ,turn into MIN mode, it will hold the min value of measuring. No auto power off and analog bar display under this mode. Press it more than 2 second , it will exit MAX/MIN states.

3. hFE transistor COM

4. Knob: Switch measuring function and range.

5. Temperature COM

6. Voltage、Current、resistance、frequency and GND

COM.

7.battery case.

See picture 1

### 4-2.DCV measuring

1.Select the knob to  $V_{DC}$  range.

2. Insert the black test lead to "COM" terminal and the red one to "V/Ω/Hz" terminal.

3.Auto range is the original states, it will display "AUTO" symbol, press "RANGE" key change to manual range mode, 600mV、6V、60V、600V、1000V range is selective;

4. Connect the leads crossly to the electric circuit under test; LCD displays polarity and voltage under test connected by the red test lead.

**Note:**

1. Firstly users should select the knob to the highest range, if users had no idea about the range of voltage under test, and then select the proper range based on displaying value. If LCD displays "OL", it means meter is over the max. Value of this range, thus should select the knob to a higher range.

2. Do not input a voltage over DC 1000V.

3. Be carefully while measuring a high voltage. DO NOT touch the high voltage circuit.

4.When the measuring voltage large than DC1000V , the built -in buzzer will be sounds.

### 4-3.ACv measuring

1.Select the knob to  $V_{AC}$  range;

2. Insert the black test lead to "COM" terminal and the red one to "V/Ω/Hz" terminal.

3. Auto range is the original states, it will display "AUTO" symbol, press "RANGE"key change to manual range mode, 6V、60V、600V、750V range is selective;

4. Connect the leads crossly to the electric circuit under test, LCD displays voltage by the test lead.

**Note:**

1. Firstly users should select the knob to the highest range, if users had no idea about the range of voltage under test, and then select the proper range based on displaying value. If LCD displays "OL", it means meter is over the max. Value of this range, thus should select the knob to a higher range.

2. Do not input a voltage over AC 750V.

3. Be carefully while measuring a high voltage. DO NOT touch the high voltage circuit.

4.When the measuring voltage large than AC750V , the built -in buzzer will be sounds.

### 4-4.DCA measuring

1.Insert the black test lead to "COM" terminal and the red one to "mA" terminal (the Max. 600mA) or to "20A"(the Max.20A);

2.Select the knob to a proper DCA range, press "DC/AC" key to select the measurement mode, then connect the leads crossly to the electric circuit under test; LCD displays polarity and current under test connected by the red test lead.

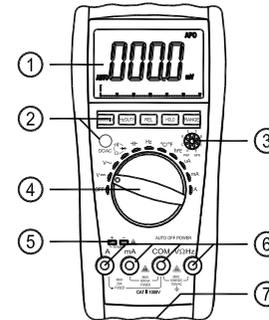
**Note:**

1. Firstly users should select the knob to the highest range, if users had no idea about the range of current under test, and then select the proper range based on displaying value .

2. If the LCD displays "OL", it means the current is over range. Now you need to select the knob to the higher.

3. Max. input current is 600mA or 20A (subject to where the red test lead insert to) , too large current will damage the fuse.

### 4-5.ACA measuring



1.Insert the black test lead to “COM” terminal and the red one to “mA” terminal (the Max. 600mA) or to “20A”(the Max.20A);

2. Select the knob to a proper ACA range, press “DC/AC” key to select the measurement mode ,and connect the leads crossly to the electric circuit under test. LCD displays current by the test lead.

**Note:**

1 Firstly users should select the knob to the highest range, if users had no idea about the range of current under test, and then select the proper range based on displaying value .

2.If the LCD displays “OL”, it means the current is over range. Now you need to select the knob to the higher.

3.Max. input current is 600mA or 20A (subject to where the red test lead insert to) , too large current will damage the fuse.

**4-6.Resistance measurement**

1. Select the knob to a proper resistance range, and connect the leads crossly with the resistor under tested.

2.insert the black test lead to “COM” terminal and the red one to “V/Ω/Hz” terminal.;

3.Auto range is the original states ,press “RANGE”key change to manual range mode.

4.When measuring the min. resistance ,please short-circuit the test leads at first, press “REL” ,then test the resistance ,it will display the actual resistance.

**Note:**

1 Firstly users should select the knob to the highest range, if users had no idea about the range of resistance under test, and then select the proper range based on displaying value .

1. The LCD displays “OL” when the resistance is over the selected range. The knob should be adjusted to a higher range. When measuring value is over 1MΩ, the reading will take a few seconds to be stable. It's normal for high resistance measuring.

2. When input terminal is in open circuit, overload displays “OL”.

3. When measuring in line resistor, be sure that the power is off and all capacitors are released completely.

4. Do not input any voltage at resistance range even the meter has voltage protection functions at this range!

**4-7.Capacitance measurement**

1.select knob to “”range;

2. insert the black test lead to “COM” terminal and the red one to “V/Ω/Hz” terminal.;

3.if the LCD doesn't display “0”, press “REL” to clear the reading;

4.Select the knob to proper capacitance range, and insert the measuring accessories or test leads into “COM” and “VΩHz” terminal.(Note :the red test leads is for positive pole  $\oplus$ ).LCD displays capacitance value.

**Note:**

1. Don't input voltage or current to the “VΩHz”terminal when measuring the capacitance or the capacitance isn't away from the “Cx” terminal.

2. In order to assure the accuracy, please press “REL” to clear the reading before testing.

3. There is only the auto range mode under the capacitance range.

4. The capacitance must be complete discharge before testing.

5. The reading of 400uF range delay 15 seconds

**4-8.Frequency measurement**

1. Insert the black test lead to “COM” terminal and the red one to “V/Ω/Hz” terminal.;

2.select the knob to “Hz”range, insert the test leads or shielded cable to the signal source or the load which is tested.

3.Press“Hz/DUTY” key to switch frequency/duty cycle, it will display the frequency or duty cycle of the signal source which is tested.

**Note:**

1. There is only the auto range mode under the frequency range;

2. The meter can still work if the input is higher than 10Vrms, but the accuracy is not guaranteed;

3. In noise environment, you'd better use shield cable to measure a low signal;

4. When measuring high voltage circuit, any parts of your body should not touch the high voltage circuit;

5. Don't input voltage higher than 250V DC or AC peak value, or it may damage the meter.

**4-9.Transistor hFE measuring**

1.Select the knob to hFE range;

2.Define the transistor is NPN or PNP type, insert the emitter, base and collector separately to the correct hole, the approx. value will be displayed on LCD.

**4-10. Diode and Continuity performance test:**

1. Insert the black test lead to “COM” terminal and the red one to “V/Ω/Hz” terminal (the polarity of red lead is “+”)

2.Select the knob to “” range ,press “DC/AC” key to select the measurement mode, connect test leads with the diode under tested,

3.Forwarder measuring :insert the red test leads connect to diode positive polarity, the black test leads to diode cathode polarity, the reading is the approx. value of diode forward volt drop.

4.backward measuring: the red test connect to diode cathode polarity, the black test leads to diode positive polarity ,the LCD display “OL”;

5.The complete diode testing include forward and backward measurement, if the result isn't meet the above, it means the diode is bad.

5. press “DC/AC” key to select the Continuity measurement mode.

6.Insert test leads to two points of tested circuit, if the inner buzzer sounds, the resistance is less than (50±10)Ω.

**Note:**

1.Don't input voltage at “” range.

2.Make sure be power off and discharge the capacitor, any AC signal will make the buzzer sounds.

**4-11.Temperature measurement**

1.Select the knob to “C/ F” range.

2.Insert the cold point of thermocouple to “ K Temp” socket , put the working end (temperature measurement end) of thermocouple on the surface or inside the object to be tested.

Then you can read temperature from the screen, and the data is in Centigrade .press “DC/AC”key to select Fahrenheit, the data is in Fahrenheit.

**Note:**

1.If insert the thermocouple opposited , it will display the mistake value ,when the temperature is rising, the value will be down.

2.when the input terminal open-circuit ,it will display the normal temperature.

3.Don't change the temperature probe optionally ,or the value accuracy isn't guarantee.

4.Don't input voltage at temperature range.

**4-12. Data holding**

Press HOLD key,presently measured value is held on LCD and HOLD symbol displays. press

it again ,the function is cancelled.

#### 4-13.Auto power off

1. When the meter stops work about 15 minutes, the built-in buzzer will be sound 5 times and turn into sleeping mode, 1 minute later, the buzzer sound a long voice 1 time, the meter will be power off. Press any key to restart the power.
- 2.Press “DC/AC” key and then turn on, the auto power off function will be cancelled.

#### 5. Meter maintenance

1. Don't input the voltage value higher than DC 1000V or AC 750V
2. Don't measuring the voltage at current, resistance, diode and continuity rage
3. Don't use the meter when the battery isn't install or the back case isn't firm.
4. When replacing fuse, please take away the test leads from the measuring point and power off at first.
5. Keep the meter away from water, dust and shock.
6. Do not store and operate the meter under the condition of high temperature, high humidity, combustibile, explosive and strong magnetic place.
7. Wipe the case with a damp cloth and detergent; do not use abrasives and alcohol.
8. If do not operate for a long time, should take out the battery to avoid leakage.
9. When “” symbol displays, should replace the battery following the steps:

9-1. see picture 2, move holster at first.

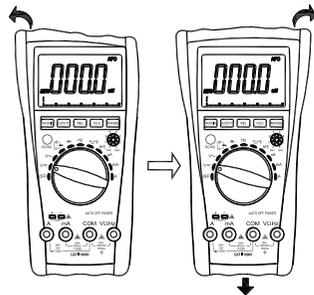
9-2.Unlock the button and remove the battery case;

9-3. Take out the old battery and replace the new one. It's better to use alkaline battery for longer life.

9-4.fit on battery case and bolt.

9-5,see the picture to fit on the holster.

10.fuse change: When replacing fuse, please change another same type and specification fuse.



#### Note:

#### 6. Trouble shooting

If the meter does not work properly, check the meter as following:

Fault	Solution
No reading on LCD	<ul style="list-style-type: none"> <li>■ Turn on the power</li> <li>■ Replace battery</li> </ul>
 signal appears	<ul style="list-style-type: none"> <li>■ Replace battery</li> </ul>
No current or temperature input	<ul style="list-style-type: none"> <li>■ Replace fuse</li> </ul>

Big error Value	<ul style="list-style-type: none"> <li>■ Replace battery</li> </ul>
ACV big error value	<ul style="list-style-type: none"> <li>■ The voltage was measured frequency higher than 400Hz</li> </ul>

- The specifications are subject to change without notice.
- The content of this manual is regarded as correct , error or omits Pls. contact with factory.
- We hereby will not be responsible for the accident and damage caused by improper operation .The function stated for this User Manual cannot be the reason of special usage.

E-VC99/V1.0