

## OPERATION MANUAL

The meter is a high performance, high accuracy, 3 3/4-digit, 32mm digit high by LCD displaying meter. The function includes DCV, ACV, DCA, ACA, resistance ,capacitance, frequency, temperature, duty cycle measurement, triode, diode and continuity test. Also with the function of unit signal displaying ,relative value measuring ,auto range/ manual range switch ,auto power off and warning function etc.

### SAFETY NOTES

The meter meets with IEC1010standard. Read the notes before operating.

- ① Before measuring, check the test leads carefully.
- ② Do not input a value over allowable limited when measuring to avoid electric shock meter damage.
- ③ Be careful when measuring voltage over DCV60V, ACV40V.
- ④ To select correct function.
- ⑤ The test leads should be taken away from the testing point when changing function.
- ⑥ Never take measurement when the test leads are in current terminal.
- ⑦ Do not try to modify the circuit.
- ⑧ Safety symbols
  - “ “ dangerous voltage
  - “ “ GND
  - “ “ dual insulation
  - “ “ refer to the operation manual
  - “ “ low battery

### SPECIFICATION

#### 1. General

- 1-1,Display: 3 3/4digit LCD with a max readings of 3999, Automatic negative polarity indication.,
- 1-2.Measuring method: Dual-slop integrating A/D converter system.
- 1-3.Sampling rate: Approx. 3times/second.
- 1-4 Over range indication: “ OL” display.
- 1-5.Low battery: The “ ”is display.
- 1-6.Operating environment : Temperature (0°C to 40°C), humidity<80%RH.

1-7.Storage environment: Temperature (-10°C to 50°C), humidity<80%RH.

1-8.Power: 2pcs 1.5V AAA 7# battery.

1-9.Dimension: 185(L)X93(W)X35(H)mm.

1-10Weight: Approx. 290g(including battery).

1-11.Accessories: manual, gift box ,holster ,TP01 temperature probe, test leads and 2pcs 1.5V battery.

### 2. Technical

2.1 Accuracy:  $\pm(a\% \times \text{reading} + \text{digits})$  at 23 $\pm$ 5°C,<75%RH.

#### 2.2 DCV

Range	Accuracy	Resolution
400mV	$\pm(0.5\%+4d)$	0.1mV
4V		1 mV
40V		10 mV
400V		100 mV
1000V	$\pm(1.0\%+4d)$	1V

Input impedance: 400mv range>40M $\Omega$ ,other range is 10M $\Omega$ .

Overload protection: 1000V DC or 700V AC peak value

#### 2.3 ACV

Range	Accuracy	Resolution
400mV	$\pm(1.5\%+6d)$	0.1mV
4V	$\pm(0.8\%+6d)$	1 mV
40V		10 mV
400V		100 mV
750V	$\pm(1.0\%+6)$	1V

Input impedance: 400mv range>40M $\Omega$ ,other range is 10M $\Omega$ .

Overload protection: 1000V DC or 700V AC peak value

Frequency response: 750V range: 40~100Hz, other range: 40~400Hz

Displaying: sinewave RMS(average value response)

#### 2.4 DCA

Range	Accuracy	Resolution
400uA	$\pm(1.0\%+5)$	0.1 $\mu$ A

4000uA		1 $\mu$ A
40mA		10 $\mu$ A
400mA		100 $\mu$ A
4A		1mA
20A	$\pm(2.0\%+5)$	10mA

Max. measuring volt drop: 400mV under mA range, 200mV under A range.

Max. input current: 20A(less than 15sec.)

Overload protection: 0.5A/250V fuse, 13A/250V fuse.

#### 2.5 ACA

Range	Accuracy	Resolution
400uA	$\pm(1.5\%+5)$	0.1 $\mu$ A
4000uA		1 $\mu$ A
40mA		10 $\mu$ A
400mA		100 $\mu$ A
4A		1mA
20A	$\pm(2.0\%+10)$	10mA

Max. measuring volt drop: 400mV under mA range, 200mV under A range.

Max. input current: 20A(less than 15sec.)

Overload protection: 0.5A/250V fuse, 13A/250V fuse.

Frequency response: 40~100Hz under 10A range, 40~400Hz at other range.

#### 2.6 RESISTANCE

Range	Accuracy	Resolution
400 $\Omega$	$\pm(0.8\%+5)$	0.1 $\Omega$
4k $\Omega$	$\pm(0.8\%+1)$	1 $\Omega$

40kΩ		10Ω
400kΩ		100Ω
4MΩ		1kΩ
40MΩ		10kΩ
		±(1.2%+5)

Open circuit voltage: 400mV.

Overload protection: 250V DC/AC peak value

**NOTE:**

**2.7 CAPACITANCE**

Range	Accuracy	Resolution
4nF	±(2.5%+6)	1pF
40nF	±(3.5%+8)	10pF
400nF		100pF
4μF		1nF
40μF		10nF
200μF	±(5.0%+8)	100nF

Overload protection: 250V DC/AC peak value

WARNING: do not input any voltage at this range! When measuring, the capacitor should be completely released and the power must be turned off.

**2.8 FREQUENCY**

Range	Accuracy	Resolution
10Hz	±(0.5%+4)	0.001Hz
100Hz		0.01Hz
1000Hz		0.1Hz
10kHz		1Hz
100kHz		10Hz
1MHz		100Hz

30MHz		1kHz
-------	--	------

INPUT SENSOR: 0.7V。

Overload protection: 250V DC/AC peak value

**2-9. hFE**

Range	Accuracy	Test condition
hFE NPN or PNP	0~1000	Current is 15uA, Vce is approx. 4.5V

**2.10 DIODE AND CONTINUITY TEST**

Range	Accuracy	Resolution
	Diode forward volt drop	Forward DCV is approx. 0.5mA, reversed voltage is approx. 1.5V
	If the resistance of the two tested points is less than (70±10)Ω, buzzer sounds.	Open circuit voltage: 0.5V

Overload protection: 250V DC/AC peak value

WARNING: do not input any voltage at this range.

**2.11 TEMP.**

Range	Accuracy	Resolution
-40°C-1000°C	<400°C±(0.8%+4) ≥400°C±(1.5%+15)	1°C

Thermocouple: K type

WARNING: do not input any voltage at this range.

**OPERATION**

**4-1. panel description**

- LCD displaying
- Function keys:
  - 2-1.RST key: when the meter under

sleep or lock states, press this key, the meter will be activated.

2-2.Hz/DUTY key:when measuring the AC voltage or AC current, it can switch frequency/duty cycle/voltage(current),when measuring the frequency, it can switch frequency/duty cycle(1-99%).

2-3.REL key: press this key, clear the reading to Zero, enter relative value measuring.

2-4:HOLD key: press the key, the present measuring value is held on LCD and display“HOLD”; press it again will exit the function and “HOLD” disappear.

2-5.Range key: select auto range or manual range.

2-6.DC/AC key,select DC/AC mode.

3.Knobe: change measuring function and range.

4.Temperature jack.

5.Voltage,Current,Resistance,Frequency,GND jack

6.Battery Case.

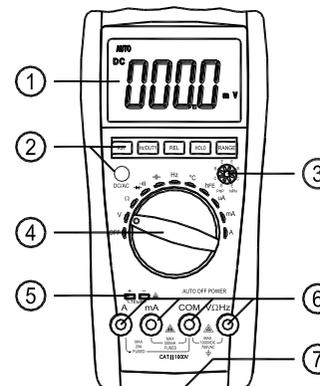
See the photo

**4-2. DCV measurement**

- 1 Insert the black lead to “COM” socket and the red one to “ VΩHz” socket;
- 2 Set the function switch to “V” range, press DC/AC key to select DC measuring mode.
- 3.the default states is auto range, display”AUTO” symbol,press “range” key to select manual range , you can choose 400mV、 4V、 40V、 400V、 1000V range.
- 4.connect the test leads to the test point ,voltage and polarity of the point which connect with red test leads will be display on LCD.

**NOTE:**

1. If “OL” displays, it means over-range, should set the range knob to a higher range.
2. The tested voltage can not be over 1000V DC; when changing function and range, the leads must be away from the testing point.



3. Be careful when measuring high voltage.

#### 4-3. ACV measurement

1. Insert the black lead to "COM" socket and the red one to "VΩHz" socket.
2. Set the function switch to "V" range, press DC/AC key to select AC measuring mode
- 3.the default states is auto range, display "AUTO" symbol,press "range" key to select manual range , you can choose 400mV、 4V、 40V、 400V、 750V range.
- 4.connect the test leads to the test point ,voltage and polarity of the point which connect with red test leads will be display on LCD.

#### NOTE:

1. the 400mV range only has the manual range,if you need to use 400mV range,press "RANGE" key to select this range.
- 2.If "OL" displays, it means over-range, should set the range knob to a higher range.
- 3.The tested voltage can not be over 750V AC; when changing function and range, the leads must be away from the testing point.
- 4.Be careful when measuring high voltage.

#### 4-4. DCA measurement

- 1 Insert the black lead to "COM" socket and the red one to "mA" or "20A" socket.
- 2 Set the function switch to "A" range, press DC/AC key to select DC working mode,connect the test leads across to the circuit under tested, the current value and polarity of the point which red lead connect will display on LCD.

#### NOTE:

- 1.If the measured current is unsure beforehand, should set the range knob to a higher range, then, switch to a proper range according to the displayed value.
- 2.If "OL" displays, it means over-range, should set the range knob to a higher range.
- 3.When tested current  $\geq 10A$  under 20A range ,buzzer will be sound.
- 4.Max. input current is 400mA or 20A (subject to where red lead insert), excessive current will blow the fuse. Be careful when measuring 20A due to un-fused. Continuously measuring large current may heat the circuit, affect the accuracy,

even damage the meter.

#### 4-5. ACA measurement

- 1 Insert the black lead to "COM" socket and the red one to "mA" or "20A" socket.
- 2.Set the function switch to "A" range, press DC/AC key to select AC working mode ,connect the test leads across to the circuit under tested, the current value and polarity of the point which red lead connect will display on LCD.

- 1.If the measured current is unsure beforehand, should set the range knob to a higher range, then, switch to a proper range according to the displayed value.

- 2.If "OL" displays, it means over-range, should set the range knob to a higher range.

- 3.When tested current  $\geq 10A$  under 20A range ,buzzer will be sound.

- 4.Max. input current is 400mA or 20A (subject to where red lead insert), excessive current will blow the fuse. Be careful when measuring 20A due to un-fused. Continuously measuring large current may heat the circuit, affect the accuracy, even damage the meter.

#### 4-6. Resistance measurement

1. Insert the black lead to "COM" socket and the red one to "VΩHz" socket.
2. Set the function switch to "Ω" range, if the resistance under measured f unknown, should set to a higher range.
- 3.press "Range " key to select auto range or manual range mode.
- 4.if measuring the small resistance, should short-circuit at first, press "REL" key,and then measuring the unknown resistane, it actual resistance will be display on the LCD,

#### NOTE:

1. If the measured resistance is unsure beforehand, should set the range knob to a higher range, then, switch to a proper range according to the displayed value.
2. If "OL" displays, it means over-range, the range knob should be set to a higher range.When the resistance is over  $1M\Omega$ , the reading should take a few seconds to be stable. It is normal at high resistance measurement.
- 3.When input terminal is open circuit, "OL" displays.

4.When measuring in-line resistance, be sure the power has been turned off and all capacitors are fully released.

- 5.Do not input voltage at this range.

#### 4-7. Capacitance measurement

- 1 Set the function switch to " II " range
2. Insert the black lead to "COM" socket and the red one to "VΩHz" socket.
- 3.if the LCD isn't display zero ,press "REL" key to clear zero.
4. Insert the capacitor to "Cx" socket according to the polarity, the value will display on LCD.

#### NOTE:

1. Don't input voltage and current signal in the "VΩHz" jack when measuring the capacitor.
2. Be sure to press "REL" to clear zero before measuring.
3. Capacitance range only have auto range working mode.
4. Release the capacitors completely to avoid damaging the meter
5. 200uF range input reading steady large than 15 Sec..
6. Unit: 1uF=1000nF 1nF=1000pF

#### 4-8. Frequency measurement

1. Insert the black leads to "COM" socket and the red one to "VΩHz" socket.
2. Set the range switch to "Hz" range.
- 3 The range is auto-range. Connect the leads across to the signal under measured, the value will be displayed on LCD.

#### NOTE:

1. There is only auto-range at this range.
2. When input is over 10V Ac rms, reading is possible, but maybe over-range.
3. It's better to use shield cable when measuring small signals in noisy place.
4. Be careful when measuring high voltage.
5. Do not input voltage over 250V DC/AC peak value.

#### 4-9. hFE measurement

1. Set the function switch 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 Test

1. Insert the black leads to “COM” socket and the red one to “VΩHz” socket( the polarity of the red one is “+”).

2. Set the FUNCTION switch to “ ” position. Press “ DC/AC ”key to select diode measuring.

3. Forward measurement: connect the red test leads to the “+” polarity of the diode under tested and the black one to “-“, the approx. forward voltage of this diode will be displayed on LCD.

4 Backward measurement: connect the red test lead to the “-“ of the diode and the black one to “+”, and LCD will displayed OL. The completely measurement includes forward and backward measurement, if the result can not meet with the above, it means the diode is workless.

5.Diode test include forward measurement and backward measurement, if the result is different with above, the diode is bad.

6.press “DC/AC” key to select continuity test.

7.Continuity test: the buzzer sounds when the resistance under measured is less than  $(70+10)\Omega$ .

#### Note:

1. Do not input voltage at this range.
2. Turn off the power and release all capacitors when testing in line.

#### 4-11. Temperature measurement

1. Set the function switch to “C” range.

2.Insert the cold point of thermocouple too “Temp” socket and the working point to the place wanted to take temperature, the value will be displayed on LCD.

#### NOTE:

1. When the input terminal is in open circuit, will display the “ normal temp.”
2. Do not change the thermocouple, or, the accuracy can not be secured.
3. Do not input voltage at this range.

#### 4-12.DATA HOLD

Press “ HOLD” key once, the current data will be hold on LCD, press it again, data is canceled.

#### 4-13 Auto power off

1.When operating after 15 minutes, the meter will be auto power off and into sleep mode;

Press “POWER AUTO OFF” key twice can turn the power on

2.press “DC/AC” key before turn on, it can cancel auto power off function.

#### MAINTENANCE

Do not try to modify the inner circuit.

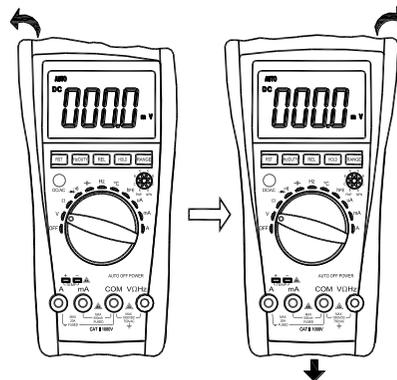
#### NOTE:

1. Do not input a voltage over 1000V DC/AC peak value.
2. Do not measure voltage at current range, resistance range, diode and buzzer range.
3. Do not use the meter if the battery is not replaced well or the battery case is not fixed.
4. Before replacing battery or fuse, release the test leads from the test point and turn power off.
- 5.Keep the multimember dry. Keep the multi-meter away from dust and dirt
- 6.Use and store the multi-meter only in normal temperature environments. Temperature extremes can shorten the life of electronic devices, damage batteries, and distort or melt plastic part.
- 7.Handle the multiyear gently and carefully. Dropping it can damage the circuit boards and case and can cause the multi-meter to work improperly although the holster can provide enough protection.
- 8.Wipe the multi-meter with a damp cloth occasionally to keep it looking new. Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the multi-meter.
9. Take out off the battery if do not use for a long time. When LCD displays “”, the battery should be replaced.

9.1 ref.pic.2 to take out the holster.

9.2 Remove the screw on the bottom case and lift the bottom case.

9.3 Remove the spent battery and replace it with a battery of the same type.



10. Replace the fuse with same type and rating as the replacements.

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

CONDITIONS	WAY TO SOLVE
NO DISPLAYING	<ul style="list-style-type: none"> <li>■ Power is off</li> <li>■ HOLD key</li> <li>■ Replace battery</li> </ul>
 symbol displays	<ul style="list-style-type: none"> <li>■ Replace battery</li> </ul>
BIG ERROR	<ul style="list-style-type: none"> <li>■ Replace battery</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.