DIGITAL MULTIMETER OPERATION MANUAL

1. GENERAL

The instrument is a stable and good performance digital multi-meter driven by battery. Its LCD with 42mm-high figure makes the reading clear. Overload protection makes the operation is convenient.

The instrument has the function of measuring DCV, ACV, DCA, ACA, resistance, capacitance, frequency, and diode, triode and continuity test. The instrument takes dual-integral A/D converter as key point, is an excellent tool.

2. SAFETY NOTES

The meter meets the standard of IEC1010. Please read below notes carefully before operation.

2-1 Do not input the limited voltage of 1000V DC or 700V AC RMS when measuring voltage.

2-2 Voltage less than 36V is a safety voltage. When measuring voltage higher than DC 36V, AC 25V, please check the connection and insulation of test leads to avoid electric shock.

2-3 Be sure to keep the test leads off the testing point when converting function and range

2-4 Select correct function and range to avoid fault operation.

2-5 Do not input a current over 20A.

2-6 Safety symbols

"⚠" exists high voltage, "⏚"GND, "▢" dual insulation,

"⚠" must refer to manual, "🔋"low battery

3. SPECIFICATION

3-1．GENERAL

3-1-1. Displaying : LCD displaying

3-1-2. Max. indication: 19999（4 1/2）, auto polarity indication

3-1-3. Measuring method: dual slope A/D transfer

3-1-4. Sampling rate: approx. 3 times/sec

3-1-5. Over range indication: MSD displays "OL"or"-OL"

3-1-6. Low battery indication: "🔋" symbol displays

3-1-7. Operation environment: 0～40℃, relative humidity <80%

3-1-8. Power: one 9V battery (NEDA1604/6F22 or equivalent)

3-1-9. Meas.:190*88.5*27.5 mm

3-1-10．Weight: approx. 422g（including battery）

3-1-11. Accessories: Operation manual, Test leads (Red & Black 1 pair), Shock-proof cover, Gift box, etc.

3-2 TECHNICAL DATA

3-2-1 Accuracy: ± (a% × reading + digits) at 23 ± 5℃,relative humidity <75%. One year guarantee since production date.

3-2-2 Function:

·DCV	·Resistance　Ω	Tru RMS measurement
·ACV	·Diode continuity testing	·Frequency　　f
·DCA	·Triode　　hFE	·Unit symbol display
·ACA	·Capacitance　C	Auto power off
Backlight display		

3-2-3. TECHNICAL DATA

3-2-3-1. DCV

Range	Accuracy	Resolution
200mV	±(0.05%+5)	0.01mV
2V		0.0001V
20V		0.001V
200V		0.01V
1000V	±(0.1%+5)	0.1V

Input impedance: 1MΩ for 200mV; 10MΩ for other ranges

Overload protection: 200mV range: DC 250V or AC peak value.

　　　　　　　Other ranges: DC 1000V or AC peak value

3-2-3-2. ACV

Range	Accuracy (the input is over 10% of the range)		Resolution
200mV	40Hz~400Hz	±(1.0%+25)	0.1mV
	400Hz-20kHz	±(2.5%+60)	
2V	40Hz~400Hz	±(0.8%+25)	1mV
	400Hz-20kHz	±(2.5%+60)	
20V	40Hz~400Hz	±(0.8%+25)	10mV
	400Hz-20kHz	±(2.5%+60)	
200V	40Hz~400Hz	±(0.8%+25)	100mV
	400Hz ~1kHz	±(1.5%+25)	
750V	40Hz~200Hz	±(1.0%+25)	1V
	200Hz~1kHz	±(1.5%+25)	

Input impedance：2MΩ at all ranges

Over-range protection：200mV range: DC 250V or AC peak value.

　　　　　　　Other ranges: DC 1000V or AC peak value

Displaying：1）True RMS（true value response）

　　　　2）It's normal that Some range do not turn to "0" and it do not affect the measuring accuracy

　　　　3）When measuring AC+DC, the accuracy should be ±(1%+25) on original basis.

3-2-3-3.DCA

Range	Accuracy	Resolution
200uA	±(0.5%+4)	0.01uA
2mA		0.0001mA
20mA		0.001mA
200mA	±(0.8%+6)	0.01mA
2A	±(2.0%+15)	0.0001A
20A	±(2.0%+15)	0.001A

Max. measuring volt drop: 200mV

Max. input current: 20A（within 10 seconds）

Over-range protection:0.2A/250V of range less than 200mA

；20A/250V fast melt fuse on other range.

NOTE : 20A range：≤5A, continuous measurement is allowed.

　　　5A~20A : continuous measurement time should be less than 10 sec. Time interval should be more than 5 min.

3-2-3-4. ACA

Range	Accuracy	Resolution
200mA	±(1.5%+25)	0.1mA
20A	±(2.5%+35)	10mA

Max. measuring volt drop：200mV

Max. input current：20A（within 10 seconds）

Over-range protection：≤200mA, 0.2A/250V fuse；20A/250V fast melt ceramic fuse for other range；

Frequency response：40~1kHz

Displaying：True RMS

　　　　When test AC+DC, the accuracy should be ±(1%+25) on original basis.

3-2-3-5. RESISTANCE（Ω）

Range	Accuracy	Resolution
200Ω	±(0.3%+10)	0.01Ω
2kΩ		0.1Ω
20kΩ	±(0.3%+5)	1Ω
200kΩ		10Ω
2MΩ		100Ω
20MΩ	±(1.2%+25)	1kΩ
200 MΩ	±(5%+45)	10kΩ

Open voltage：less than 3V

Overload protection：DC 250V or AC peak factor

Note: At range 200Ω, should make the test leads short, and measure the resistance of the wire, then, subtract it from the actual measuring value.

3-2-3-6. CAPACITANCE

Range	Accuracy	Resolution
20nF/ 200nF		1pF /10pF
2uF /20uF	±(4.0%+50)	100pF/1nF
200uF/2000uF		10nF/100nF

Overload protection：DC 36V or AC peak value；

3-2-3-7. FREQUENCY

Range	Accuracy	Resolution
20Hz/200Hz		0.001Hz/0.01Hz
2kHz/20kHz	±(0.1%+3)	0.1Hz/1Hz
200kHz/2MHz		10Hz/100Hz

Input sensitivity：1.5Vrms；

Overload protection：DC 250V or AC peak value (within 10sec.)

3-2-2-8.DIODE AND CONTINUITY TEST

RANGE	DISPLAYING VALUE	TEST CONDITION
⯈⊣•)))	Diode forward volt drop	Forward DC current is approx. 1mA, backward voltage is approx. 3V
	Buzzer rings, the impedance between the two testing points is less than(50±20)Ω	Open voltage is approx. 3V

Overload protection：DC 250V or AC peak factor

Warning: Do not input any voltage value at this range for safety!

3-2-2-9. hFE

Range	Scope	Testing condition
hFE NPN or PNP	0~1000	Base DC current is approx. 10uA，Vce is approx. 3V

3-2-2-10 Conductance measurement

| Range	Accuracy	Resolution
(0.1-100)nS	±(1.0%+30)	0.1nS

4. OPERATION

4-1．Front panel

4-1-1. LCD: display the measured value
4-1-2. Power/ Hold/auto power off key,power off function can be cancelled.
4-1-3. Hold/ turn on/off backlight key.
4-1-4.Tride input terminal
4-1-5. backlight indicator :press AC+DC to turn it on/off.
4-1-6. Knob switch: selecting measuring function and range.
4-1-7. COM for measuring current 20A/2A.
4-1-8.COM for measuring current 200mA.
4-1-9. GND,capacitance and temperature anode COM.
4-1-10.Voltage ,resistance,capacitance,temperature and diode anode COM.
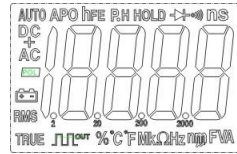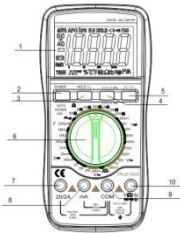
4-2．DCV measurement

4-2-1. Apply the black test lead to "COM" terminal and the red one to "V/Ω/Hz" terminal.
4-2-2. Switch the knob to a proper DCV range, then, crossly connect the test leads with the measured circuit, the voltage and polarity of the point which connected with the red test lead will be displayed.
NOTE:
1. If the voltage under measured is unclear beforehand, should set the range knob to the highest range, then, switch to a proper range according to the displaying value.. If LCD displays"OL", it means over-range, the range knob must be switched to a higher range.
2. Do not input a voltage over 1000V, or the meter might be damaged.
3. Be careful when measuring high voltage circuit.
4.Be sure to keep the test leads off the testing point after complete all the measurement .

4-3．ACV measurement

4-3-1. Apply the black test lead to "COM" terminal and the red one to "V/Ω/Hz" terminal.
4-3-2. Set the range knob to a proper ACV range, then, connect the test leads crossly with the measured circuit.
NOTE:
1. If the range under measured is unclear beforehand, should set the range knob to the highest range, then, switch it to a proper range according to displaying value.. If LCD displays "OL", it means over-range, should set the range knob to a higher range.
2. The remained digits do not affect the measuring accuracy.
3. Do not input a voltage over RMS 750V, or, the meter might be damaged.
4. Be careful when measuring high voltage circuit.
5. Be sure to keep the test leads off the testing point after complete all the measurement .

4-4. DC current measurement

4-4-1. Apply the black test lead to "COM" terminal and the red one to "mA" terminal (Max.200mA), or the red test lead to "20A" terminal (max. 20A)
4-4-2. Set the range knob to a proper DCA current range, then, connect the meter with the measured circuit, the measured current value and the polarity of the point which connected by the red test lead will be displayed on LCD.
NOTE:
1. If the range under measured is unknown beforehand, should set the range knob to the highest, then, switch it to a proper range according to the displaying value; If LCD displays"1", it means over-range, the range knob must be set to a higher range.
2. The max. input current is 200mA or 20A/2A (subject to the position where the red test lead be inserted), large current may blow the fuse. Be careful especially at 20A range, because there is no fuse protection, large current may heat the circuit, even damage the meter.

3.Do not parallel connect test lead to any circuit when test lead insert in current input terminal .It may damage the fuse and meter.
4. After complete all the measurement ,Should turn the power off ,then keep the test leads off the testing point.
5.Do not input DCV 36V and ACV 25V between current input terminal and "COM" terminal .

4-5．AC current measurement

4-5-1. Apply the black test lead to "COM" terminal，and the red one to "mA" terminal (max. 200mA), or the red test lead to "20A" terminal (max. 20A);
4-5-2. Set the range knob to a proper AC current range, then, connect the meter with the circuit under measured.
NOTE:
1. If the current range under measured is unknown beforehand, should set the range knob to the highest, then, switch it to the proper range according to the displaying value. If LCD displays "1", it means over-range, must set the range knob to a higher range.
2. The max. input current is 200mA or 20A（subject to the position where the red test lead be inserted），large current might blow the fuse，be careful especially at 20A range, because there is no fuse protection, large current may heat the circuit, even damage the meter.
3. The remained digits do not affect the measuring accuracy.
4.Do not parallel connect test lead to any circuit when test lead insert in current input terminal .It may damage the fuse and meter.
5.. After complete all the measurement ,Should turn the power off ,then keep the test leads off the testing point.
6.Do not input DCV 36V and ACV 25V between current input terminal and "COM" terminal .

4-6．Resistance measurement

4-6-1. Apply the black test lead to "COM" terminal，and the red one to "V/Ω/Hz" terminal.
4-6-2. Set the range knob to a proper resistance range, connect up the test leads across the resistance under measured.
NOTE:
1. If the resistance value is over the selected range value, "1" displays, thus, should set to a higher range. When measuring value is over 1MΩ，the reading needs a few seconds to be stable. It's normal for high resistance measuring.
2. When input terminal is open-circuit, overload displays.
3. Before measuring in-line resistance, be sure that power is off and all capacitance are released.
4. Do not input voltage at this range.

4-7．Capacitance measurement

1. Apply the black test lead to "COM" terminal，and the red one to "V/Ω/Hz" terminal.
2.Set the knob to proper capacitance range, and insert the capacitor under tested.
NOTE:
1. If the capacitance is unknown beforehand, should set the range knob to the highest, then, switch it to a proper range according to the displaying value. If "1" displays, it means over-range, should set to a higher range.
2. Before taking measurement, LCD displaying might not be zero, the remaining will become smaller and smaller. It could be ignored.
3. If creeps seriously or the capacitor is breakdown when measuring large capacitance, some digits are displayed and unstable.
4. Before measuring, should release the capacitor completely to avoid damage.
5. Unit: 1uF =1000 nF   1nF=1000pF

4-8. Transistor hFE

4-8-1. Set the range to hFE range.
4-8-2. Select NPN or PNP , insert separately emitter, base and collector to proper terminal.

4-9．Diode and continuity test

4-9-1．Apply the black test lead to "COM" terminal，and the red one to "V/Ω/Hz" terminal（the polarity of the red test lead is "+"）.

4-9-2. Set the range knob to ⯈⊢◦)) , connect the test leads with the diode under measured, and the reading is close to the value of diode forward voltage drop.
4-9-3. Connect the test leads with two points of circuit under measured, if the inner buzzer sounds, the resistance between two points is less than (70±20)Ω approximately.
NOTE: Do not input voltage at" ⯈⊢◦)) " range to avoid damage.

4-10．Frequency measurement
4-10-1. Apply the test leads or shield cable to "COM" and "V/Ω/Hz" terminal.
4-10-2. Switch the knob to frequency range, and connect crossly the test leads with the signal source or the measured load.
NOTE:
1. When input is over 10V rms，reading is possible but maybe over-range.
2. Shielding cable be recommended when measuring small signal under noisy condition.
3. Be careful when measuring high volt circuit.
4. Do not input a voltage over DC 250V or AC peak factor to avoid damage to the meter.

4-11．DATA HOLD

Press down the "HOLD" key, the present value is held on LCD ,press it again ,the function is cancelled .

4-12. AUTO POWER OFF

After stop working for 15±10 minutes ,the meter will be into sleep mode,Press "HOLD APO" key for 2sec.to turn on the power .Press "HOLD APO" for 2sec. to cancel the function of auto power off and "APO" disappear ; Press it again for 2 sec. to restart the auto power off function and "APO" showing on LCD.

4-13.POWER ON/OFF

Press "POWER B/L" key for 2 sec. to turn the power and the meter enter into working mode , press it again to turn it off .

4-14. BACKLIGHT DISPLAY

Press "POWER B/L" key to turn on the backlight ; Press it again to turn it off ;It will be auto power off after 15 sec.

5．MAINTENANCE

Do not try to modify the electric circuit.
5-1. Keep the meter away from water, dust and shock.
5-2. Do not store and operate the meter under the condition of high temperature, high humidity, combustible, explosive and strong magnetic place.
5-3. Clean the case with a damp fabric and detergent, do not use abrasives and alcohol.
5-4. If do not operate for a long time, should take out the battery to avoid leakage
5-5. Replacing fuse
Please use the same type and specification fuse as replacement.

6. TROUBLE SHOOTING

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

ERROR	SOLUTION
NO DISPLAYING	●Turn on the power ●HOLD key ●Replace battery
symbol displays	●Replace battery
NO CURRENT INPUT	●Replace fuse
BIG ERROR	●Replace battery

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