6000 COUNTS
Digital Multimeter
USER'S MANUAL

(Ⅰ) Overview

The new 6000 counts display digital automotive multimeter , with excellent design, easy to operate, accurate reading, full symbol display, full-featured, using the latest software design, automatic calibration software, high precision, good stability, the use of new protective cover, with the magnetic suction function, large-screen LCD display, and in particular, has a backlight function and flash-light function, suitable for operation under dark environment.

The input of the "V" jack is connected to the PTC thermistor, and the core part of the logarithmic table - the function / range switch is particularly well protected, greatly improving the safety and service life of the product. It can measure DC voltage, current, AC voltage, current, resistance, capacitance, frequency, temperature, speed, closing angle, test light, positive and negative pulse, crystal diode, triode parameters and circuit. The product is suitable for car maintenance, debugging and etc.. It is your ideal measuring tool.

(Ⅱ) Safety rules and precautions

- Please read the instruction manual carefully before use.
- It is strictly prohibited to use with the rear cover uncover, otherwise it will be subject to electric shock.
- Before use should check the test leads Insulation, no damage and disconnection.
- The input signal level is not allowed to exceed the specified limit to protect against electric shock and damage to the instrument.
- Do not rotate the function / range switch while measuring.
- Measuring the potential difference between the common end "COM" and "V Ω" shall not exceed 1000V, in case of electric shock.
- Under the circumstances that the measured voltage is higher than DC60V and AC30V , should be careful to prevent electric shock.
- When LCD display "  " symbol , indicating that the battery voltage is insufficient, should replace the battery in time to ensure the measurement accuracy.

● Replacement of fuses within the instrument should be of the same type.

(Ⅲ) Electrical symbol

DC		Buzzer	
AC		Low battery	
Diode		Rotational speed	
Dwell angle		Warning tips	
Double insulation		High voltage hazard	

(IV) Function

1.Low power consumption CMOS Double integral A/D conversion integrated circuit， auto zeroing, auto polarity display, Data hold, low battery and over range indicator.

2. DC basic accuracy: +0.5% (6000 display)

3. Capacitance measurement: 10pF~100mF

4.Temperature measurement: -40ºC~1000ºC

5. Full range overload protection function.

6. Backlight function: applicable to the dark environment.

7. Auto Power Off: Turn off the power supply automatically about 15 minutes after starting, so as not to forget to switch off the power when the meter is used.

8. Maximum display: 5999 (6000 display)

9. LCD: 63 x 40mm large screen, high contrast, full symbol display, words height 25mm, clear and artistic.

10. Power Supply: one 9V battery (NEDA1604, 6F22 type or equivalent type)

11.Low battery voltage indication： At LCD left part shows " " symbol.

12. Size: 180x88x53mm

13. Weight: about 359g (including battery, holster).
14. Environment condition:
Operation temperature: 0ºC~40ºC
Relative humidity <85%
Storage Temperature: -10ºC~50ºC
Relative humidity <85%
Guaranteed accuracy temperature: 23ºC+5ºC
Relative humidity <75%

Note:

meter is manual range , is auto range.

(V) Technical indicators

Accuracy: + (% reading + digit) one year warranty.
Environmental humidity: 23ºC+5ºC
Relative humidity: <75%

1. Dwell angle

Measuring Range		Accuracy	Resolution ratio
1CYL	0-180.0°	±(1.2%+2)	0.1°
4CYL	0-90.0°		
6CYL	0-60.0°		
8CYL	0-45.0°		

Overload protection: 250V DC or AC peak

2. Rotational speed

Measuring Range		Accuracy	Resolution ratio
1CYL	500 ~ 10000 Turn / min	±(1.2%+2)	10 Turn / min
4CYL			
5CYL			
6CYL			
8CYL			

Overload protection: 250V DC or AC peak

3. Duty cycle

Measuring Range	Accuracy	Resolution ratio
0～100.0%	±(1.2%+2)	0.1%

4. DC voltage

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

Input impedance : 10MΩ

Overload protection： 1000V DC or AC peak

5. AC voltage (TRMS)

Measuring Range	Accuracy	Resolution ratio
6V	±(0.8%+3)	1mV
60V		10mV
600V		100mV
750V	±(1.2%+3)	1V

Input impedance: 10MΩ

Frequency range: 40Hz-1KHz

Overload protection: 1000V DC or AC peak value

Display: TRMS

6.DC current

Measuring Range	Accuracy	Resolution ratio
6mA	±(1.2%+3)	1uA
60mA		10uA
600mA		100uA
20A	±(2%+5)	10mA

Measuring Range	Accuracy	Resolution ratio
20A	±(2%+5)	10mA

Overload protection：0.6A/250V restoring insurance
Maximum input current:20A/10second
Measuring voltage drop: Full scale voltage drop 600mV

7. AC current (TRMS)

Measuring Range	Accuracy	Resolution ratio
6mA	±(1.2%+3)	1uA
60mA		10uA
600mA		100uA
20A	±(2%+5)	10mA

Measuring Range	Accuracy	Resolution ratio
20A	±(2%+5)	10mA

Overload protection：0.6A/250V restoring insurance
Maximum input current:20A/10second
Measuring voltage drop: Full scale voltage drop 600mV
Frequency range: 40Hz-1kHz
Display: TRMS

8.Resistance

Measuring Range	Accuracy	Resolution Ratio
600Ω	±(0.8%+3)	0.1Ω
6kΩ	±(0.8%+2)	1Ω
60kΩ		10Ω
600kΩ		100Ω
6MΩ		1kΩ
60MΩ	±(1%+5)	10kΩ

Overload protection: 250V DC or AC peak
Open-circuit voltage: < 0.5V

9. Capacitance

Measuring Range	Accuracy	Resolution Ratio
6nF	± (5%+3)	1pF
60nF		10pF
600nF	± (3%+3)	100pF
6uF		1nF
60uF		10nF
600uF		100nF
6mF	± (5%+3)	1uF
60mF		10uF
100mF		100uF

10. Temperature

Measuring Range	Measuring Range	Measuring Range
-40℃ ~ 400℃	±(0.75%+4)	1℃
400℃ ~ 1000℃	±(1.5%+15)	1℃
-40 ~ 752℉	±(0.75%+4)	1℉
752 ~ 1832℉	±(1.5%+15)	1℉

11. Frequency

Measuring Range	Accuracy	Resolution Ratio
6Hz ~ 10MHz	±(5%+3)	0.001Hz ~ 10kHz

12.Transistor hFE Parameter Test

Range	Description	Test Conditions
hFE	Can measure NPN or PNP Transistor hFE parameter. Range : 0-2000β	Ib approx 10uA, Vce approx 3V

13.Diode and Circuit measurement

Measuring Range	Description	Test Conditions
	Positive forward voltage drop of display diode	Forward current of about 1mA, reverse voltage of about 3V
	On-resistance < about 30Ω when the buzzer ring	The open-circuit voltage is about 1V

Overload protection: 250V DC or AC peak

(VI) Operation Diagram

① LCD display
② Function selection button
③ Triode test jack
④ Data-hold/ backlight button
⑤ Turntable switch
⑥ Test lead jack
⑦ Indicator lighting
⑧ Lighting button

(Ⅶ) Operations instruction

Press “POWER” key, if low battery, the LCD display will show “ symbol on the left side, then replace the battery. Choose the measurement function and range.

1. Dwell angle measurement

According to the number of engine cylinder, set function/range switch in “DWELL” range.

Insert the black test lead into COM jack, and the red test lead into VΩ jack.

Connect the black test lead on the battery negative pole, red test lead to the low voltage connector or the negative pole of ignition coil “-“(see the figure)

Start the engine, the dwell angle value will shown on the display.

Note：

1. For best results, refer to the technical parameters provided by the engine manufacturer. Generally speaking, the dwell angle of the three cylinder engine is about 60-80 degrees, the dwell angle of the 4 cylinder engine is about 45-60 degrees, and the dwell angle of the 5 cylinder engine is about 36-48 degrees, the dwell angle of the 6 cylinder engine is about 30-40 degrees, and the dwell angle of the 8 cylinder engine is about 22.5 - 30 degrees.
2. If the angle is too large, the gap between the contact is too large and the angle is too small, then the gap between the contacts is too narrow.
3. If you adjust the dwell angle, you must adjust the ignition timer.

2. Rotational Speed measurement

According to the number of engine cylinder, set function/range switch in “TACH” range.

Insert the black test lead into COM jack, and the red test lead into VΩ jack.

Connect the black test lead on the battery negative pole, connect red test lead to the low voltage connector or the negative pole of ignition coil “-“(see the figure)

Start the engine, the result of Frequency speed will shown on the display. (Rotational speed = reading value x 10 cycle/minute)

3. Duty Cycle measurement

Set the function/range to “DUTY” position.

Insert black test lead into “COM” jack, insert red test lead into V Ω jack

Connect the black test lead on the battery negative pole, connect red test lead to the low voltage connector or the negative pole of ignition coil “-“

Start the engine, the dwell angle value will shown on the display.

NOTE:

The duty cycle of other pulse signals can also be measured. At this time as long as the two test lead connected in the measured signal source at both ends, can read the signal's duty cycle.

4. DC voltage measurement

Set function switch to “DCV” position. (DC voltage measurement is automatic range).

Insert black lead into “COM” socket, red lead into VΩ socket.

Connect the test lead to tested load or the signal source in parallel. the instrument will indicate the polarity of the red test lead on display at the same time voltage readings. (See Figure 4 for details)

NOTE:

a. DC voltage measurement is automatic range.

b." ⚠ "Means not to measure the voltage higher than 1000V, although it may display readings, but it may damage the multimeter.

c. Special attention should be paid to safety when measuring high voltage.

5.ACV measurement

Set function switch to "ACV" position. (AC voltage measurement is automatic range).

The black test lead is inserted into the COM socket, the red test lead is inserted into the exposed test lead socket (VΩsocket), and the test lead is connected in the measured load or signal source. (See Figure 4 for details)

NOTE:

a. AC voltage measurement is automatic range, refer DC voltage test notes a、c、。

b. " ⚠ "Means not to measure the voltage higher than 1000V, although it may display readings, but it may damage the multimeter.

6. DCA measurement

Set the function switch to 'DCA" position.

Insert the black test lead into COM socket and the red lead into the mA or 20A socket. The test lead string into the circuit under test, the instrument displays the current reading with the red test lead polarity indication.

NOTE:

a. Before measuring the current range of the measured current, the function / range switch should be placed in the highest range.

b. When only "OL" is shown, the measured current has exceeded the range used, and a higher range measurement should be used.

c. When mA socket inputting, if overload then the machine self recovery insurance would open. A few minutes later, insurance automatically restored. Specification for 0.6A/250V.

d. When 20Asocket inputting, maximum current 20A time should not exceed 15 seconds. There's 20A/250V fuse.

7. AC current measurement

Set function switch in “ACA” position. (refer to DCA measurement procedure).

Insert the black test lead to COM socket and the red test lead into the mA or 20A socket. The test lead string into the circuit under test.

NOTE:

Refer DC current measurement notes a、b、c、d.

Figure 4

8. Resistance measurement

Set function switch in “Ω” position.

Insert the black test lead into COM socket and the red test lead into the exposed VΩ socket （The red test lead for measuring circuit "+" pole）.The tester is connected across the measured

resistance.

NOTE:

a. When the input is open-circuit, the meter is in the over range state and displays "OL".

b.When the measured resistance higher than 1MΩ above the table, it takes seconds to stabilize the reading , this is normal for high resistance measurement readings.

c.When measuring the resistance on the line, the power supply of the circuit under test shall be closed, and the capacitance of the circuit under test shall be discharge, then to be measured.

9. Capacitance measurement

Set the function in measure CAP position, (capacitance measure-ment is automatic range), waiting automatic calibration of instrument. For the 20nF range, it's normal to have about 3 words left. (The red test lead for measuring circuit "+" pole) .Polarity capacitor (such as electrolytic capacitor), Positive electrode connected with the red test lead, negative electrode connected with the black test lead.

NOTE:

a.For charged capacitors, discharge should be conducted first and then measured.

b.When measuring large capacitors, it takes a long time.

c. Unit: 1pF=10^{-6}uF; 1nF=10^{-3}uF.

d. Do not insert a high voltage capacitor (especially a large capacity) directly into the test socket.

10. Temperature measurement

Set the function switch into °C position when measuring the temperature, insert the black thermocouple into socket, please note the "+ -" pole. The hot socket thermocouple (testing point) put into the testing position. Read the temperature value on the LCD screen.Press the "SEL" key to convert in degrees Celsius (°C) / Fahrenheit (°F).

Note :

a. Reading format : the temperature is automatically measured when connected with thermocouple. When the thermocouple is not inserted or the thermocouple is at the state of open-circuit, it is shown the environmental temperature.

b. Attached with accessory of TP-01 (K type) simple thermocouple, the maximum temperature is 250ºC (300ºC for instant)

11. Transistor hFE measurement

Set the function switch in “hFE” position.

Make sure the transistor is ‘PNP” type or “NPN” type, then insert E, B, C lead into the related socket.

The reading is “hFE” approximately value, the test conditions are: the base current is only about 10uA, Vce approx 2.8V.

12. Diode measurement

Set the function switch to “ ” position. Press “SEL” key to select diode function

Connect the black test lead to “COM” socket, and the red test lead to “VΩ” socket. Please note the inner power of the red test lead is in “+” polarity. Let the test lead connect across the measured diode. The instrument shows the forward voltage drop of the diode, the unit "volt", and displays the over range when the diode is reversed.

NOTE:

a. When the two test lead are not connect, the over-range ("OL") is displayed.

b. The current measured by the device is about 1mA.

13. Frequency Hz measurement

Set the function / range switch in Hz range (frequency measurement is auto range).

Insert the black test lead into COM socket and the red test lead into the exposed VΩ socket, and the test lead connected to the measured signal source. The frequency of the signal to be

measured is showed on the display. (The red test lead for measuring circuit "+" pole) .The tester is connected across the measured resistance.

14. Continuity Measurement:

Set the function / range switch in " " range, Press"SEL"key to select on-off test function

Insert the black test lead into COM socket and the red test lead into the exposed VΩ socket, match the test leads at both ends of the line to be checked.

Checked the resistance is less than about 30Ω, the buzzer will issue a "beep" sound as indicator, red light tube are bright.

NOTE:

a. The measured line must be cut off the power state to check, or will lead to instrument error.

15. Test lamp measurement:

Set the function / range switch on the " " range.

Insert the black test lead into COM socket and the red test lead into the exposed VΩ socket. First let the black test lead ground-contact, and the red test lead connect test point. If the test point has a voltage of +12 V, the test light will turn on the green light, the display will display the voltage and polarity. If the test point is a negative voltage, the test light will be red light, and the voltage and polarity will be displayed on the display. Test light function can determine whether the line is blocked or the line is aging.

NOTE:

1. When using the test lamp range, the voltage should not be higher than 24V.
2. Where the car with a yellow casing to trap the line and the thicker yellow line is best not to measure.
3. Where the purple with a thick line also do not test. That is ABS line.

4. With the computer board connected to the line also do not test may lead to computer host lock machine.
5. While looking for a line, don't mess up the line in the plug, or it may lead to poor wiring inside the car and cause trouble.

16. Battery measurement: BAT

Set the function / range switch in the BAT range
Insert the black test lead into the COM socket, the red test lead insert into VΩ socket , place the test leads across the ends of the battery to be tested. The instrument has 68 ohm load resistance, the display will show the battery load voltage and polarity.
The battery measurement function can only measure the voltage below 24V battery. Battery measurement can measure the battery with the load capacity to determine the battery is good or bad.

17. Positive and negative pulse measurement：

Set the function / range switch on the “ ” range.
Insert the black test lead into the COM socket, the red test lead insert into VΩ socket. Match the test leads at both ends of the line to be checked. The measured circuit is positive pulse or positive voltage, and the green indicator light is on. The measured circuit is a negative pulse or a negative voltage, and the red indicator light is on.

18. NVC Test

Set the function / range switch in the “NVC”range
The front end of the meter is close to the line under test. There is an AC voltage of 110V-380V on the line. The meter will alarm. According to the strength of the signal under test, the meter will emit 3 different alarm sounds, and the light indicator will light.

19. Data hold function

Press HOLD key. The meter displays the "HOLD" symbol. At this point the measurement data is locked， easy to read, record. And then press the HOLD key to reset, "HOLD" symbol disappears,

the instrument to restore the measurement state.

20. Backlight function

For the convenience of dark environment operation, the instrument has a backlight after the LCD display. Press"LIGHT" key for 2 seconds, the backlight is lit; 2 more seconds, the backlight goes out.

21. Selection of instrument display angle

This series of instruments are equipped with protective cover, in addition to the protection of the body, but also muti-angle support the body, easy to observe.

(Ⅷ) Maintenance

Your digital multimeter is a sophisticated electronic instrument, should pay attention to maintenance.

1. Do not receive more than 1000V DC or 750V AC voltage up.
2. Do not use the front cover of the instrument before it is completely covered.
3. Unplug the test lead and turn off the power switch after that is able to replace battery.
Unscrew the battery cover, take off the bracket and the battery cover, so that can remove the battery. Please replace the battery according to the specifications.
4. Unplug the test lead and turn off the power switch after that is able to replace the fuse. Unscrew the rear cover , appropriate force in the lower part of the shell, so that can open the back cover to open the instrument; after put the same specification fuse, to close the back cover screw can be used.
5. The specification of the fuse: 20A / 250V.
6. If the instrument is not used for a long time, the battery should be removed, and place in a dry, airy environment.
7. Do not tamper with internal circuitry so as not to be damaged.

(IX) Accessories Enclosure

1. User's manual ·····1pc
2. Guarantee certificate·····1pc
3. Rubber holster (with magnet)·····1pc
4.Test Lead with clip·····One pair
5.Simple K-type thermocouple (with a plug)