3 3/4 Digit Multimeter

Users Manual

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Introduction

This is a high performance, low power consumption and 3 3/4 digits (4000 Counts) mutimeter. The meter is made by large integrated circuit. Include manual and auto range and all functions and ranges are protected for overload. Measuring AC/DC voltage, AC/DC current, resistance, diode, continuity, capacitance, frequency, duty and temperature.

Unpacking and Inspection

Unpacking and removing the meter, and scrutiny as following, if missing or damaged, please contact the distributor.

- Multimeter 1
- User manual 1
- Test leads 1
- Thermocouple 1
- RS232C interface 1
- Software CD 1

⚠ Safety Information

The meter has been designed according to IEC1010_1 concerning safety requirements for electrical measuring instruments with an over voltage category (1000V CAT.Ⅲ) and pollution 2.

⚠ WARNING:

READ “SAFETY INFORMATION” AND “WARNING INFORMATION” BEFORE USING THIS MULTIMETER!

Safety Precautions

Injury or death can occur even with low voltages and low current. It is extremely important that you read this safety information before using your multimeter. Follow all safety practices and proper operating procedures for equipment being tested.

- ✧ Exercise extreme caution: Measuring voltage above 20V, measuring current greater that 10mA, measuring AC power line with inductive loads, measuring AC power line during electrical storms.
- ✧ Always inspect your multimeter an test leads for sign of damage or abnormality before every use. If any abnormal conditions exist (i.e., broken or damaged test leads, cracked case, display not reading, etc.), do not attempt to take measurements.
- ✧ Never ground yourself when taking electrical measurements. Do not touch exposed metal pipes, outlets, fixtures, etc., which might be at ground potential. Keep your body isolated from ground by using dry clothing; rubber shoes, rubber mats, or any approved insulating material.
- ✧ Never touch expose wiring, connections, test probe tips, or any live circuit conductors when attempting to make measurements.
- ✧ Never replace the protective fuse inside the multimeter with a fuse other than the

specified

- ✧ or approved equal fuse. Replace only with same type of fuses. To avoid electrical shock, disconnect the test leads and any input signals before replacing the fuses.
- ✧ Replace only with same type of battery. To avoid electrical shock, disconnect the test leads and any input signals before replacing the battery.
- ✧ Do not operate this multimeter in an explosive atmosphere (i.e., in the presence of flammable gases or fumes, vapor or dust.).
- ✧ Measuring voltage that exceeds the limits of the multimeter may damage the meter and expose the operator to a shock hazard. Always recognize the multimeter voltage limits on the front of meter.
- ✧ Never apply more than 1000 DCV or 700 ACV between the COM jack and earth ground.
- ✧ Never touch a voltage source when the test leads are plugged into a current jack.
- ✧ When testing for the presence of voltage or current, make sure the voltage or current ranges are functioning correctly. Take a reading of a known voltage or current before assuming a zero reading indicates no current or voltage.
- ✧ Do not attempt calibration or service unless trained and another person capable of rendering first aid and resuscitation is present.

A Quick Tour

1. Symbol Explanation

⚠	Attention!		Low Battery
ϟ	Dangerous Voltage!		Fuse
⏚	Ground	CE	European union directives
∿	AC	⧈	Double Insulation
⎓	DC		

2. Instrument Layout

①. LCD

②. Keys: select measuring function

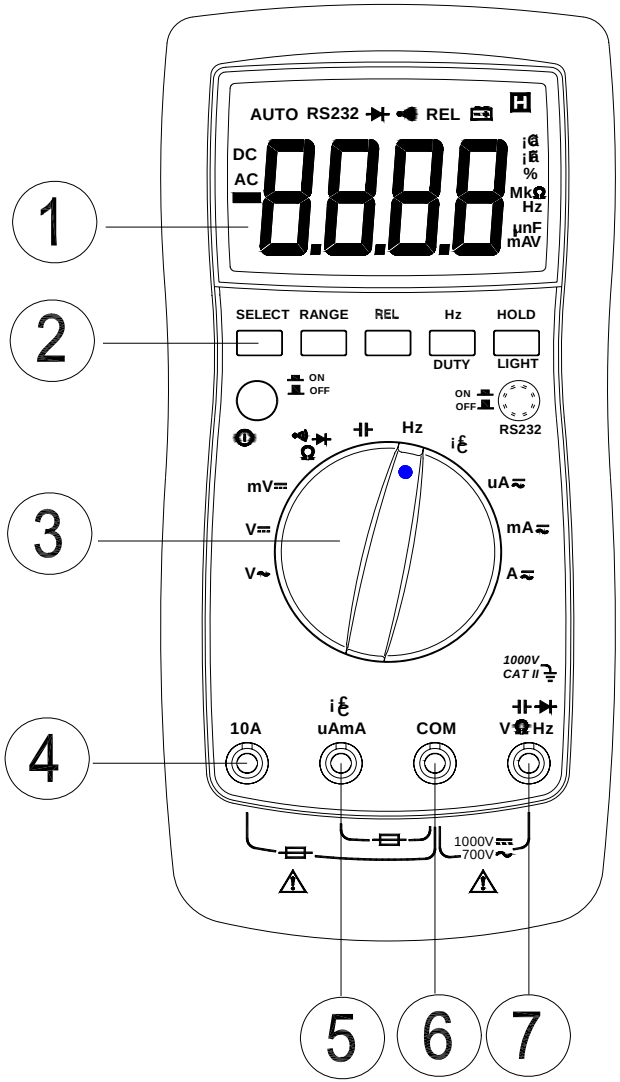
③. Function/Range selector rotary switch

④. 10A input terminal: This is positive input terminal for measuring 10A current, which connect with the red test lead.

⑤. μ A/mA/°C input terminal: This is the positive input terminal for measuring 400mA current and temperature, which connect with the red test lead.

⑥. COM input terminal: This is the negative input terminal for all measurement modes, which connect with the black test lead.

⑦. Hz/V/Ω input terminal: This is the positive input terminal for voltage, resistance, duty, frequency, capacitance, diode and continuity, which connect with the red test lead.



3. Keys Function

SELECT (Function Switch): Select is the function select key that acts with trigger. Use the key as measuring functions select.

RANGE (Auto/Manual Range): This key is the auto/manual key. Power on default is auto measurement, and press one time to switch to the manual measurement. In manual measurement mode, the system will jump up one mode for each press until the highest mode, then return to the lowest mode as a loop. If press the key over 2 seconds, the system will switch back to auto measurement status. Frequency and capacitance measurement cannot use manual measurement.

REL (Relative Value Measurement): Rel key is the relative value measurement key. Except Hz/Duty, Diode and Continuity, other functions can do the relative value measurement.

Hz/DUTY (Frequency/Duty Cycle): Hz/Duty is the frequency/Duty Cycle select key. In frequency measurement mode, press the key can select frequency or duty cycle measurement mode; in AC/DC voltage or AC/DC current mode, press the key can proceed to voltage, Frequency, Duty cycle or Current, Frequency, Duty cycle measurement mode select.

HOLD/LIGHT (Reading Hold/Back Light): Hold/BL key is the reading bold/back light control key. To press the key, the display value will be locked and keep unchanged.

To press the key again, the locked status will be erased and enter the normal measurement status. When press and hold the key over 2 seconds, the backlight will be on. In the backlight on status, press the key over 2 seconds, the backlight will be off.

POWER: power on or off.

RS232: serial data output on or off.

4. Other Functions

Auto power off: In the process of measuring, no matter the function key or switch, if there is no any action on them within 30 minutes, the meter will be auto power off(standby mode). In auto power off status to press the function key or switch, the meter will be auto power on(operating mode). To press and hold the SELECT key to turn the system on, the auto power off function will be cancelled. And in RS232 operation mode, the auto power off function will be cancelled.

Buzzer: When press any key or turn any function switch, the buzzer will raise one sound (approx. 0.25 second to 1second). In the continuity measuring status, if the resistance is smaller than

50Ω ,the buzzer will sound.

Serial data output: The meter has the serial data output function. When the meter is connected with the computer interface, it can output the measuring data for recording, analyzing, processing and printing the measuring results.

Making Measurements

1. Measuring AC or DC Voltage

a) Turn the rotary switch to **ACV** or **DCV** or **DCmV** range.

b) Insert the black and red test leads into the **COM** and **VΩ Hz** input terminal.

c) Connect the test leads tip in parallel with the circuit to be measured. And don't touch any electrical conductors.

d) Press Hz/Duty key one times then meter enter measuring frequency status; press it again then meter enter measuring duty status; press it three times then meter return measuring voltage status.

e) Read the result directly from LCD.

⚠ **WARNING:**

- **Can't measure higher than 1000V DC or 700V AC.**
- **When measuring high voltage, don't get and electric shock.**
- **After measuring completely, disconnection the test leads with the circuit to be**

measured.

2. Measuring AC or DC Current

a) Turn the rotary switch to **μ A**, **mA** or **A** range. Power on default is DC measurement, press one time **SELECT** key to switch to AC measurement.

b) Insert the red and black test leads into the **μ AmA** or **A** and **COM** input terminal.

c) Connect the test leads tip in serial with the circuit to be measured. And don't touch any electrical conductors.

d) Press Hz/Duty key one times then meter enter measuring frequency status; press it again then meter enter measuring duty status; press it three times then meter return measuring voltage status.

e) Read the result directly from LCD.

⚠ **WARNING:**

- **Can't measure higher than 10A in 10A range; and can't measure higher than 400mA in μ A or mA range, otherwise the fuse will blowout.**
- **Measurement time must fewer 10 seconds at measuring great current every**

times, and the interval time must more 15 minutes every times.

- **After measuring completely, disconnection the test leads with the circuit to be measured.**

3. Measuring Resistance

a) Turn the rotary switch to the **Ω** range.

b) Insert the black and red test leads into the **COM** and **VΩ Hz** input terminal.

c) Connect the test leads tip in parallel with the circuit to be measured. And don't touch any electrical conductors.

d) Read the result directly from LCD.

⚠ **WARNING:**

- **Before measuring resistance in circuit to be sure power off; and to be sure that capacitor has been discharge fully.**
- **For measuring resistance above 1MΩ , the meter may take a few seconds to get stable reading. This is normal for high resistance measurements.**
- **Any voltage present during a resistance measurement will cause inaccurate readings and could damage the meter if exceeding the overload protection of**

250V.

- **After measuring completely, disconnection the test leads with the circuit to be measured.**

4. Measuring capacitance

a) Turn the rotary switch to the capacitance range.

b) Insert the black and red test leads into the **COM** and **VΩ Hz** input terminal.

c) Connect the test leads tip in parallel with the circuit to be measured. And don't touch any electrical conductors.

d) Read the result directly from LCD.

⚠ **WARNING:**

- **Before measuring capacitance in circuit to be sure power off; and**
- **Before measuring capacitance to be sure that has been discharge fully.**
- **After measuring completely, disconnection the test leads with the circuit to be measured.**

5. Measuring Frequency and Duty

a) Turn the rotary switch to the **Hz** range.

b) Insert the black and red test leads into the **COM** and **VΩ Hz** input terminal.

c) Connect the test leads tip in parallel with the circuit to be measured. And don't touch any electrical conductors.

d) At measuring frequency status, press Hz/Duty one times then meter enter measuring duty status; press it again then return measuring frequency status.

e) Read the result directly from LCD.

⚠ **WARNING**

- **Determine that the amplitude level of the signal to be measured is not greater than the input voltage limit (60V).**
- **After measuring completely, disconnection the test leads with the circuit to be measured.**

6. Measuring temperature

a) Turn the rotary switch to the temperature range.

b) Insert the Thermocouple into the **COM** andμ **AmA** input terminal.

c) Put the Thermocouple's other side on the object to be measured.

d) Read the result directly from LCD.

WARNING

- **The meter will display temperature inside meter, if no thermocouple.**
- **Don't enter other signal.**

7. Test Diode

a) Turn the rotary switch to the Ω range.

b) Insert the black and red test leads into the **COM** and **VΩ Hz** input terminal, and press SELECT key to select diode status.

c) Connect the test leads tip in parallel with the diode to be measured.

d) Read the result directly from LCD.

⚠ **WARNING:**

- **If the diode is reversing biased or there is open circuit, the reading will display "OL".**
- **Before measuring diode in circuit to be sure power off; and to be sure that capacitor has been discharge fully.**
- **After measuring completely, disconnection the test leads with the circuit to be measured.**

8. Test Continuity

a) Turn the rotary switch to the **Ω** range.

b) Insert the black and red test leads into the **COM** and **VΩ Hz** input terminal; and press SELECT key to select continuity status.

c) Connect the test leads tip in parallel tow point at the circuit , if the resistance less than 50Ω , the buzzer will sound.

Specifications

1. General specifications

Maximum voltage between terminals and earth ground: 1000V DC or 700V AC.

Display: 3999 counts, full annunciates automatic polarity.

Over range: “OL” will be displayed.

Low battery: “ ” will be displayed

Updates: approx. 3 times per second.

Data hold: yes

Back light: yes

Power supply: 9V IEC6F22, JIS006P.

Temperature: operating 0~40°C

Storage -10~50°C

Relative humidity: 20~80%RH

Safety: Designed to IEC1010_1. 1000V CAT. III

Size: 195×92×43(mm).

Weight: approx. 380g.

2. Accuracy and Resolution

Accuracy is given as ±(%reading +digits) at 18~28°C , relative humidity up to 80%

All specifications assume less than 1 year

a) DC voltage

Range	Resolution	Accuracy(%rdg +digits)
400mV	0.1mV	± (0.5%+3)
4V	0.001V	
40V	0.01V	
400V	0.1V	
1000V	1V	± (0.8%+3)

Input impedance: 10MΩ

Overload protection: 1000V DC or 700V AC

b) AC voltage

Range	Resolution	Accuracy(%rdg +digits)
4V	0.001V	± (0.8%+3)
40V	0.01V	
400V	0.1V	
700V	1V	± (1.2%+3)

Input impedance: 10MΩ

Overload protection: 1000V DC or 700V AC

Frequency range: 40~400Hz.

c) DC current

Range	Resolution	Accuracy(%rdg +digits)
400μ A	0.1μ A	± (1.2%+3)
4000μ A	1μ A	
40mA	0.01mA	
400mA	0.1mA	
10A	0.01A	± (2.0%+3)

Overload protection:μ A/mA ----- F0.5A/250V A ----- F10A/250V

d) AC current

Range	Resolution	Accuracy(%rdg +digits)
400μ A	0.1μ A	± (1.5%+3)
4000μ A	1μ A	
40mA	0.01mA	
400mA	0.1mA	
10A	0.01A	± (3.0%+3)

Overload protection: μ A/mA ----- F0.5A/250V A ----- F10A/250V

Frequency range: 40~400Hz.

e) Resistance

Range	Resolution	Accuracy(%rdg +digits)
400Ω	0.1Ω	± (1.0%+3)
4kΩ	1Ω	
40kΩ	10Ω	

400kΩ	100Ω	
4MΩ	1kΩ	
40MΩ	10kΩ	± (2.0%+3)

Overload protection: 1000Vp Open circuit voltage: 0.45V

f) Capacitance

Range	Resolution	Accuracy(%rdg +digits)
50nF	10PF	± (5%+10) <10nF: ± (5%+50)
500nF	100PF	± (3%+3)
5μ F	1nF	
50μ F	10nF	
100μ F	100nF	

Overload protection: 1000Vp

g) Frequency and Duty

Range	Resolution	Accuracy(%rdg +digits)
5Hz~ 50kHz		± (0.2%+3)
50kHz~ 5MHz		reference
0.1~ 99.9%	0.01%	reference

Overload protection: 1000Vp Sensitive: 500mV RMS

h) Temperature

Range	Resolution	Accuracy(%rdg +digits)
-20~ 400°C	0.1°C	± (3%+2°C)
400~ 1000°C	1°C	

Overload protection: F0.5A/250V

i) Diode and Continuity

Range	Resolution	Note
diode	1mV	0.5~0.8V
continuity	0.1Ω	≤ 50Ω

Overload protection: 1000Vp

Maintenance

1. Replacing battery

If the meter display ” on LCD, the battery must be replaced to maintain proper operation. Following procedure to replacing the battery:

a) Press POWER key to off. Disconnect text leads from any live source and remove the test leads from the input terminals.

b) Remove the two screws on the battery cover and open the cover.

c) Remove the exhausted battery and replace with a new 9V battery (IEC6F22 JIS006P NEDA1604 type).

d) Never use the meter unless the batter cover is in place and fastened fully.

2. Replacing fuse

Following procedure to replacing the fuse:

a) Press POWER key to off. And disconnect test leads from any live source and remove the test leads from the input terminals.

b) Remove the two screws on the battery cover and open the cover.

c) Remove the blown fuse and replace with fuse of the same size and rating. Make sure the new fuse is centered in the fuse holder.

d) The mA input terminal is protected by F0.5A/250V fast blow ceramic fuse, Φ6.3×32.

The A input terminal is protected by F10A/250Vfast blow ceramic fuse, Φ6.3×32

e) Never use the meter unless the batter cover is in place and fastened fully.

3. Others

a) Do not use abrasives or solvents on the meter, use a damp cloth mild detergent only.

b) If any faults or abnormalities are observed, the meter can not be used any more and it has to be checked out.

RS232C Serial data output

The meter has the serial data output function. When the meter is connected with computer that has installed interface (RS232) software, it can output the measuring data for recording, analyzing, processing and printing the measuring results.