

# AN8001/AN8002 Digital Multimeter

## User Manual






### Product Introduction

AN8001/AN8002 auto-ranging digital multimeter using double-integral style A/D transform as the core, can be used to measure AC/DC Voltage, AC/DC Current, Resistance, Capacitance, Diode and Continuity Testing, Temperature, Frequency and etc. The products are battery powered. They are characterized by stable function and high reliability, with the features of overload protection and LCD display for clear reading, are an ideal tools for lab, factory, radio fans and family use.

### Safety Information


Before any operations, please read the following safety precautions to avoid any possible bodily injury or property damage. This product is comply with the standard of IEC1010.

- (1) When measuring voltage, please do not input the rated 1000V DC and 700V AC voltage.
- (2) When measuring voltage exceed 36V DC or 25 AC, please ensure test lead is approachable, with correct connection and good insulation, or it may pose a shock hazard.
- (3) Before changing functions or range, disconnect the test leads from the circuit under test.
- (4) Taking the safety into consideration, use the proper terminals, function, and range for your measurements.
- (5) To avoid damages to the multimeter, do not exceed the maximum limits of the input current 10A.
- (6) Safety signs:

	Dangerous voltage		Ground terminal
	Equipment protected throughout by double insulation or reinforced insulation		Caution, risk of danger (refer to this manual for specific Warning or Caution information)
	Low voltage		

### Characteristics

#### General Characteristic

- (1) LCD display
- (2) Max display: 6000Counts
- (3) Polarity identification
- (4) Measurement mode: Double-integral style A/D transform
- (5) Sample rate: 3 times per second
- (6) Over range indication: OL
- (7) Low voltage indication: 
- (8) Working environment: 0-40°C, relative humidity < 80%

Press Select to enter continuity testing mode,  $\rightarrow$  will be displayed. Probe the test points to measure resistance in the circuit. If the reading is about 50  $\Omega$ , the multimeter will beep continuously.

**Caution:** To avoid possible damage to your multimeter or to the equipment under test, connect the circuit power and discharge all high-voltage capacitors before testing continuity.

### Measuring Temperature (AN8002 digital multimeter has this switching function)

Rotate the rotary switch to  $\text{C}$ .

Connect the red connection of the K-type thermocouple to the VRHz terminal and the black connection to the COM terminal. Probe the test points and read the display.

Press Select to change the temperature units between  $\text{C}$  or  $\text{F}$ .

Caution: (1) When in open circuit, normal temperature will be displayed.

(2) This product adopts K type thermocouple, the accuracy can not be ensured if change to other type thermocouple.

(3) To avoid possible damage to your multimeter or to the equipment under test,

connect the circuit power and discharge all high-voltage capacitors before

measuring temperature.

### Hold Mode

Press Hold to freeze the display during measurement, H will be shown on the display.

Press Hold again to exit this mode.

### Auto power-off

The multimeter automatically enters the sleep mode if the rotary switch is not moved or a key is not pressed for 15 minutes. One minute before auto power-off, the buzzer will sound "BeBeBeBeBe" five times to warn. Pressing any key will turn the multimeter back to operation mode from the sleep mode.

Press Select and power-on, the function of auto power-off will be canceled.

### General Care and Cleaning

Keep product surfaces clean and dry. And no crash.

Do not operate the product in a high temperature or wet conditions or in a flammable or explosive atmosphere or in a strong magnetic field.

Clean the instrument with a wet soft cloth not dripping water. It is recommended to scrub with soft detergent or fresh water. To avoid damage to the instrument, do not use any corrosive chemical cleaning agent.

If does not use this product for long time, remove the battery to prevent instrument from corrosion of battery leakage.

When  $\text{B}$  is displayed, the batteries shall be replaced as below:

Loosen the screws and remove the battery cover.

Replace the used batteries by two specified type and rating batteries.

Place the battery cover back in its original position and tighten the screws.

Replace fuse as above steps. Use only the specified type and rating fuse for the multimeter.

Caution: (1) Measured voltage shall never exceed 1000V DC or 750V AC.

Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, diodes, or capacitance.

Do not use this product until insert batteries or tighten the cover screws.

Ensure that the rotary switch is at the OFF position and remove test leads and any connectors from the input terminals before replacing battery or fuse.

### Measuring Resistance

- (1) Connect the black test lead to the COM terminal and the red test lead to the  $\Omega$ Hz terminal.
- (2) Rotate the rotary switch to resistance
- (3) Press Range to select the manual ranges if necessary.
- (4) If the measured resistance is small, in order to get the real resistance, you should make the test leads short-circuit, press REL once, then make measurement.

**Caution:** (1) In manual mode, if the measured current is unknown, you'd better rotate the rotary switch to the highest range firstly.  
(2) If OL is displayed, it indicates the input exceeds the selected range and the rotary switch should be set to the position with higher range. When the measured resistance is over  $1M\Omega$ , it is normal that the reading will be stable after several seconds.  
(3) When input terminal is open circuit, OL will be shown.  
(4) To avoid possible damage to your multimeter or to the equipment under test, disconnect the circuit power and discharge all high-voltage capacitors before measuring resistance.

### Measuring Capacitance

- (1) Rotate the rotary switch to  $\mu F$ .
- (2) Connect the black test lead to the COM terminal and the red test lead to the  $\Omega$ Kz terminal.
- (3) If the display reading is not zero, press REL to reset.
- (4) Connect the positive terminal of capacitor to the red test lead, and negative terminal to the black test lead. Probe the test points and read the display.

**Caution:** (1) When in  $\mu F$ , you should press REL once to reset to ensure the accuracy of value.  
(2) There is only automatic ranging in capacitance measuring mode.  
(3) To avoid possible damage to the multimeter or to the equipment under test, disconnect circuit power and discharge all high-voltage capacitors before measuring capacitance.

### Measuring Frequency

- (1) It is only suitable for low frequency and high voltage measurement, such as AC220V and AC380V, not suitable for high frequency and low voltage. (Main purpose: use in measuring AC voltage, max range:  $5V/10KHz$ ). Press Select to switch between the frequency and duty cycle measurements. Read the display.

**Caution:** (1) In frequency measuring mode, there is only automatic ranging.

### Testing Diodes/ for Continuity

- (1) Connect the black test lead to the COM terminal and the red test lead to the  $\Omega$ Kz terminal. (Polarity of the red test lead is positive.)
- (2) Rotate the rotary switch to  $\rightarrow \rightarrow$
- (3) Connect the red test lead to the positive terminal (anode) of the diode and the black test lead to the negative terminal (cathode). Read the diode forward bias. If the test lead connection is reversed, the multimeter will display OL.

- (9) Supply power: 3V ( 1.5V batteries \* 2 Pcs)
- (10) Dimension: 65x130x32 mm
- (11) Weight: 130 g
- (12) Accessories: User's manual, two pair of test leads, thermocouple (only for AN8002) and two 1.5V batteries.

**Technical characteristic**

Accuracy:  $\pm$ (Digit readings a% + Least significant digit), environmental temperature of accuracy: (23 $\pm$ 5) $^{\circ}$ C, relative humidity < 75%. Calibration warranty is a period of one year from data of production.

**warning:**

**Do not apply more than 36V DC or 25V AC between the common terminal and A terminal or mA terminal on mA function.**

(1) DC Voltage:

Measuring range	Accuracy	Resolution
600mV	$\pm$ (1.0%+10)	0.1mV
6V		1mV
60V		10mV
600V		100mV
1000V	$\pm$ (0.5%+3)	1V

Input Resistance: 10M $\Omega$

Overload protection: 1000V DC or 750V AC peak value

(2) DC Millivolt:

Measuring range	Accuracy	Resolution
600mV	$\pm$ (1.0%+10)	0.1mV

(3) AC Millivolt (True RMS):

Measuring range	Accuracy	Frequency range	Resolution
600mV	$\pm$ (3.0%+3)	40Hz-400Hz	0.1mV

(4) AC Voltage:

Measuring range	Accuracy	Frequency Response	Resolution
6V	$\pm$ (1.0%+3)	40Hz-400Hz	1mV
60V			10mV
600V			100mV
700V			1V

Input Resistance: Measuring range of 600mV is larger than 60M $\Omega$ , others are 10M $\Omega$ .

Overload protection: 1000V DC or 750V AC peak value

Frequency Response: 40Hz-400Hz

Display: True RMS (Other waveform exceed 200Hz are for reference only)

(5) Direct Current:

Measuring range	Accuracy	Resolution
600 $\mu$ A	$\pm(1.5\%+3)$	0.1 $\mu$ A
6000 $\mu$ A		1 $\mu$ A
60mA	$\pm(1.5\%+3)$	10 $\mu$ A
600mA		100 $\mu$ A
10A	$\pm(1.5\%+3)$	10mA

Maximum measuring voltage drop: Full scale mA range is 600mA, measuring range of 10 A is 200mV.

Maximum input current: 10 A (no more than 10 seconds)

Overload protection: 0.5A/250V fuse, 10 A/250V fuse

(6) Alternating Current:

Measuring range	Accuracy	Frequency Response	Resolution
600 $\mu$ A	$\pm(1.5\%+3)$	40Hz-200Hz	0.1 $\mu$ A
6000 $\mu$ A			1 $\mu$ A
60mA			10 $\mu$ A
600mA			100 $\mu$ A
10A	$\pm(1.5\%+3)$		10mA

Maximum measuring voltage drop: Full scale mA range is 600mA, measuring range of 10 A is 200mV.

Maximum input current: 10A (no more than 15 seconds)

Overload protection: 0.5A/250V fuse, 10 A/250V fuse

Frequency Response range of all currents is 40Hz-200Hz

(Other waveform exceed 200Hz are for reference only)

(7) Resistance:

Measuring range	Accuracy	Resolution
600 $\Omega$	$\pm(0.5\%+3)$	0.1 $\Omega$
6k $\Omega$		1 $\Omega$
60k $\Omega$	$\pm(0.5\%+2)$	10 $\Omega$
600k $\Omega$		100 $\Omega$
6M $\Omega$		1K $\Omega$
60M $\Omega$	$\pm(1.5\%+3)$	10K $\Omega$

Input Sensitivity: 1.5V, Overload protection: 550V AC or DC peak value.

Open-circuit voltage: 1V, Overload protection: 550V AC or DC peak value.

Note: Please make the test leads short-circuit when using 600 $\Omega$  measuring range, lead-wire resistance shall be reduced in the actual measurement.

### Measuring DC Millivolt Voltage

- (1) Connect the black test lead to the COM terminal and the red test lead to the VΩHz terminal.
- (2) Rotate the rotary switch to mV.
- (3) There is no AUTO ranging, mV can be used only when voltage does not exceed 600mV.
- (4) Probe the test points and read the display.

Caution: (1) If OL is displayed on the screen, it indicates the input exceeds the selected range, you should set the multimeter to a higher range over DC 600mV.

- (2) Measured voltage should never exceed 600mV.

### Measuring AC Millivolt Voltage

- (1) Connect the black test lead to the COM terminal and the red test lead to the VΩHz terminal.
- (2) Rotate the rotary switch to mV. Press Select, AC mV is displayed on the screen. There is no AUTO ranging, mV can be used only when measured voltage does not exceed 600mV
- (3) Probe the test points and read the display.

Caution: (1) If OL is displayed on the screen, it indicates the input exceeds the selected range, you should set the multimeter to a higher range over AC 600mV.

- (2) Measured voltage should never exceed 600mV.

### Measuring AC Voltage

- (1) Connect the black test lead to the COM terminal and the red test lead to the VΩHz terminal.
- (2) Rotate the rotary switch to Voltage.
- (3) **AUTO** ranging is set as default when the meter is powered on. **AUTO** is displayed. Press **Range** to enter the manual range mode. AC voltage ranges are 6V, 60V, 600 V, 750 V.
- (4) Probe the test points and read the display.

Caution: (1) In manual range mode, if **OL** is displayed on the screen, it indicates the input exceeds the selected range, you should set the multimeter to a higher range.

- (2) Measured voltage shall never exceed 750 V AC to avoid instrument damage or electric shock.
- (3) when make measuring high-voltage circuit, pay attention to avoiding touching the high-voltage circuit.

### Measuring DC AC Current

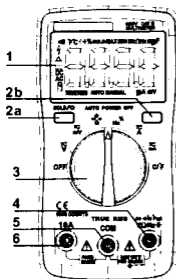
- (1) Connect the black test lead to the COM terminal. For currents below 600 mA, connect the red test lead to the mA terminal; for currents within 600 mA ~ 10 A, connect the red test lead to the 10A terminal.
- (2) Rotate the rotary switch to **Current** terminal. Select DC AC measurement mode. Connect the test leads to measured circuit and read the display.

Caution: (1) If the measured current is unknown, you'd better rotate the rotary switch to the highest range firstly, then switch to the appropriate position according to the measurement range.

- (2) If OL is displayed, it indicates the input exceeds the selected range and the rotary switch should be set to the position with higher range.
- (3) The max input current is 600mA or 10 A, the fuse burn-out or instrument damage will occur when current exceeds rated value.

### Warning:

**Do not apply more than 36V DC or 25V AC between the common terminal and A terminal or mA terminal on mA function.**



(1) LCD Display Screen: Measuring values and unit will be displayed on the screen.

Keypad:

(2)

2a--HOLD Keypad: Press HOLD to freeze the display during measurement. "HOLD" will be shown on the display. Press HOLD again to exit this mode. You can activate the backlight by pressing HOLD for more than 2 seconds and repeat it again to turn off the backlight.

2b--Select Keypad: It is used to select DC/AC, Diode/Resistance/Buzzer.

(3) 3--Rotary switch: it is used to change the measuring function and measuring range.

(4) 4--Input terminals of Voltage, resistance, capacitance, frequency and mA.

(5) 5--COM. Common ground.

(6) 6--Test Jack where current is 10A.

### Measuring DC Voltage

(1) Connect the black test lead to the COM terminal and the red test lead to the **VΩHz** terminal.

(2) Rotate the rotary switch to **Voltage**.

(3) Auto ranging is set as default when the meter is powered on, AUTO is displayed.

Press Range to enter the manual range mode. DC voltage ranges are 6V, 60V, 600 V, 1000 V.

(4) Probe the test points and read the display.



Caution: (1) In manual range mode, If OL is displayed, it indicates the input exceeds the selected range. press Range to set a higher position.

(2) Do not measure any voltage of over 1000 V DC to avoid instrument damage or electric shock.

**(8) Capacitance:**

Measuring range	Accuracy	Resolution
10nF	$\pm(5.0\%+20)$	10pF
100nF		100pF
1 $\mu$ F		1nF
10 $\mu$ F		10nF
100 $\mu$ F		100nF
1000 $\mu$ F		1 $\mu$ F
10000 $\mu$ F	$\pm(5.0\%+5)$	10 $\mu$ F

**(9) Testing Diode and for Continuity**

Measuring range	Display value	Measuring conditions
	Forward voltage drop of diode	Forward direct current is about 5mA, voltage is about 3V.
	Buzzer beeps, resistance between two testing points is less than 40 $\pm$ 30 $\Omega$	Open-circuit voltage is about 1V.

Overload protection: 550V AC or DC peak value

Caution: When in measuring diode and continuity mode, disconnect with the circuit power.

**(10) Temperature (AN8002 digital multimeter has this switching function)**

Measuring range	Accuracy	Resolution
{-20~1000} $^{\circ}$ C	<400 $^{\circ}$ C $\pm(1.0\%+5)$ $\cong$ 400 $^{\circ}$ C $\pm(1.5\%+15)$	1 $^{\circ}$ C
{-4~1832} $^{\circ}$ F	<752 $^{\circ}$ F $\pm(1.0\%+5)$ $\cong$ 752 $^{\circ}$ F $\pm(1.5\%+15)$	1 $^{\circ}$ F

Sensor: K-type (nickel chromium--nisiloy)

Caution: When in measuring temperature mode, disconnect with the circuit power.

**(11) Frequency and Duty Cycle**

Frequency	Range (Hz)	99.99Hz, 999.9Hz, 9.999kHz, 99.99kHz, 999.9kHz, 9.999MHz.
	Accuracy	0.08% rdg +2d
	Max Input voltage	250V RMS
Duty Cycle	Range	1% ~ 99%
	Accuracy	0.8% rdg +2d
	Max Input voltage	250V RMS