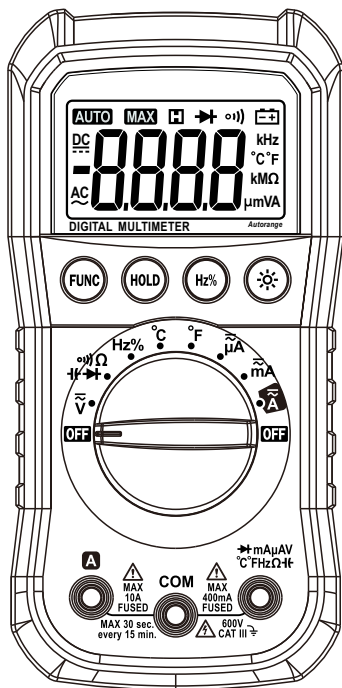


Digital Multimeter

User's Manual



Digital Multimeter

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Overview

WARNING

To avoid electric shock or personal injury, please read “safety information” and “warning and related notes” carefully before using the meter.

This a small hand-held, safe and reliable 3.5" digital auto measuring range multi-meter with stable performance and novel structure. It can be used to measure DC voltage, AC/DC current, resistance, capacitance, frequency, duty ratio, temperature, diode forward voltage drop and circuit continuity. It is an ideal maintenance tool easily carried by a large number of users.

Safety Instructions

The digital multi-meter has been designed according to International Electro Safety Standard EN61010-1 concerning safety requirements for electronic measuring instruments and hand-held digital multi-meters. It meets therequirements for CAT III 600V of EN-61010 and grade 2 for pollution.

- Users should use the meter strictly according to the provisions of this manual. Otherwise, the warranty for the meter may become invalid.
- The warnings in the user manual are used to remind users of possible danger or dangerous action.
- The notes in the user manual are used to remind users of possible meter damage or condition or action of measured object.


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Safe Working Habits

To avoid possible electric shock or personal injury as well as damage to the meter or measured objects, please use the meter according to the following procedures methods:











- Check the case before using the meter. Don't use the meter with damaged case. Check to see if the case is cracked or lacks plastic parts. Please pay special attention to the joint insulating layer.
- Check to see if the test wire has insulation damage or bare metal. Check test wire continuity. If the wire is damaged, please replace it with a new one before using the meter.
- Measure known voltage with the meter to verify that the meter is working properly. If the meter is working abnormally, stop using it immediately. A protective device may be damaged. If there is any doubt, please have the meter inspected by a qualified technician.
- Do not test voltage exceeding rated voltage marked on the meter.
- When testing voltage exceeding 30V AC voltage RMS, 42V AC peak or 60V DC, be particularly careful to avoid electric shock.
- When measuring, use correct jack, and select the proper function and measuring range.
- Do not use the meter in explosive gas, vapor or dusty environments.
- When using the probe, fingers should be behind the probe protection device.

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- When connecting circuits, connect the common test line first, then connect the charged test line. When disconnecting circuits, disconnect the charged test line first, then disconnect the common test line.
- Before measuring resistance, continuity, and diodes, first turn off power and discharge all high voltage capacitors.
- If the meter is not used in accordance with the instructions, the meter's safety protective function may become invalid.
- For all DC measurements, to avoid the risk of electric shock, please use AC function to verify the existence of any AC voltage. Then, select DC voltage measuring range equal to or greater than the AC measuring range.
- Before measuring current, please check the meter fuse, shut off power to the circuit to be tested, then connect the meter and energize the circuit.
- When opening the case (or part of the case), turn the meter off.
- When the battery low voltage indicator " " becomes lit, replace the battery at once. A low battery will cause meter reading errors and may result in electric shock or personal injury.
- Before opening the case or the battery cover, remove the test wire from the meter.
- When maintaining the meter, use replacement parts specified by the factory.

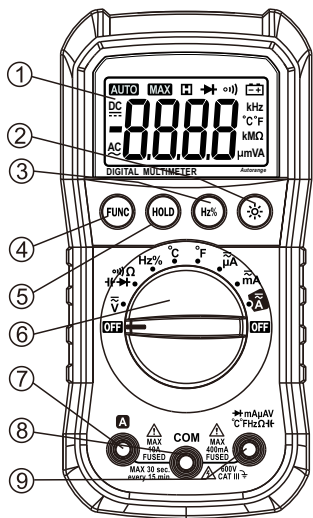
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Electric Symbols

	Important safety information.
	High voltage with danger.
	AC (Alternating Current)
	DC (Direct Current)
	AC & DC (Both direct and Alternating Current)
	Ground.
	Double Insulation (Class II safety equipment).
	Fuse must be replaced as per the specification herein.
	Accord with the related EU laws and regulations
	Conforms to UL STD. 61010-1, 61010-2-030 and 61010-2-033; Certified to CSA STD. C22.2, NO. 61010-1, 61010-2-030 and 61010-2-033
CAT III	It is applicable to test and measuring circuits connected to the distribution part of the building's low-voltage MAINS installation.

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Meter Instructions Meter Appearance

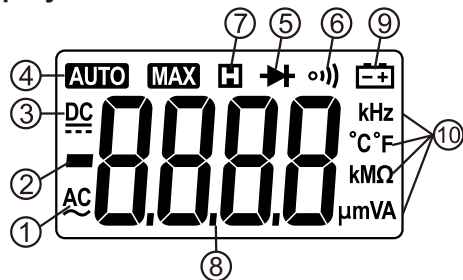


- (1) LCD display
- (2) Backlight key
- (3) Frequency/duty ratio key
- (4) Function selection key
- (5) Data hold key
- (6) Function selection switch
- (7) Positive input jack of 10A
(connected with the red test probe)

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- (8) All common input jacks for measuring (connected with the black test probe).
- (9) Positive input jack of voltage, resistance, capacitance, temperature, frequency, mA current, diode and continuity (connected with the red test probe)

Display



- (1) Alternating current indicator
- (2) Numerical value polarity indicator (negative sign)
- (3) Direct current indicator
- (4) Automatic measuring range indicator
- (5) Diode measurement function indicator
- (6) Continuity measurement indicator
- (7) Data hold indicator
- (8) Measurement display value
- (9) Battery low-voltage indicator
- (10) Measurement unit

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Keys Operation

“FUNC” key:

Function selection key, switch measurement function by pressing “FUNC” key, combined with switch


“HOLD” key:

Data hold key, press “HOLD” key; the reading will be locked and “HOLD” symbol will display on LCD display. Press “HOLD” key again to revert to normal measurement state.

“Hz/%” key:

Frequency/duty ratio selection key. At frequency position, pressing this key can select frequency or duty ratio measurement, AC/DC voltage or AC/DC current position. Pressing this key can select voltage/frequency/duty ratio or current/frequency/duty ratio measurement mode.

“” key:

Backlight switch key. Press “” key and hold for 2sec., turn on backlight; press this key when the backlight is on to turn off the backlight.

Automatic Power-Off Function

In the measurement process, if there is no activity by the function key or function selection switch for 30 minutes, the meter will automatically shutdown (sleep state). Hold “FUNC” key to power on and the automatic shutdown function will be cancelled.

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Measuring Operation

AC/DC Voltage Measurement:

- ① Rotate function selection switch to voltage measurement position.
- ② Press “FUNC” key to select AC or DC voltage
- ③ Connect black and red test probe to COM input jack and VΩmA input jack, respectively.
- ④ Measure the voltage of circuit to be tested with other ends of test probes (connected with the circuit to be tested in parallel)
- ⑤ Read the measured value from LCD display. When measuring DC voltage, the display will simultaneously show the voltage polarity which is connected with red test probe.

WARNING

Don't measure any RMS voltage higher than 600V DC or AC, to prevent injury or damage to meter and equipment.

AC/DC Current Measurement:

- ① Turn off the power to the circuit to be tested. Discharge all high voltage capacitors on the circuit to be tested.
- ② Rotate function selection switch to appropriate current position.
- ③ Press “FUNC” key to select AC or DC current.
- ④ Depending on the size of the current to be measured, connect the red test probe to 10A or VΩmA input jack and connect the black test probe to COM input jack.

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- ⑤ Turn off the circuit to be tested. The black test probe is connected to one end of disconnected circuit (low voltage relatively), and the red test probe is connected to the other end of disconnected circuit (high voltage relatively). (When measuring direct current, connecting test probe reversely would make reading become negative, but the meter won't be damaged.)
- ⑥ Connect the power to the circuit, then read the display reading. If it is overload, "OL" will display on the LCD display.

WARNING

To prevent injury or damage to meter and equipment, do not make current measurements if voltage exceeds 600V.

Note

Before measuring current, first check the meter's fuse. When measuring, use correct input end and function. When the test probe is inserted to the current input end, don't connect the other end of the test probe with any circuit in parallel

Resistance measurement:

- ① Rotate function selection switch to resistance measurement position, and turn off the power to the circuit to be tested
- ② If needed, press "FUNC" key to select resistance measurement function

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- ③ Connect black and red test probe to COM input jack and VΩmA input jack, respectively.
- ④ Measure the resistance of circuit to be tested with other ends of test probes.
- ⑤ Read the resistance value from LCD display. If it is overload, "OL" will display on the LCD display

Here are some tips for measuring resistance:

- The resistance measured on a circuit is usually different from the rated value of resistance. This is because the test current of the meter will flow through all possible channels between test probes.
- When measuring low resistance, to ensure accuracy, make a short circuit between the test probes and read the resistance value of the short circuit. This resistance value should be subtracted after measuring the resistance to be tested.
- When there is no input (for example, open circuit), the display will show "OL", which means that the measured value is out of range.

WARNING

When measuring resistance or circuit continuity, to avoid injury or meter damage, turn off the power to the circuit and discharge all capacitors.

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Capacitance Measurement:

- ① Rotate function selection switch to capacitance measurement position, and turn off the power to the circuit to be tested
- ② If needed, press “FUNC” key to select capacitance measurement function
- ③ Connect black and red test probe to COM input jack and VΩmA input jack, respectively.
- ④ Measure the capacitance of circuit to be tested with other two ends of test probes.
- ⑤ Read the capacitance measuring value from LCD display. If it is overload, “OL” will display on the LCD display

Here are some tips for measuring capacitance:

- When measuring bulk capacitors with this meter, readings will stabilize after a few seconds.
- To improve the accuracy below 20nF, subtract the distributed capacitance of meter and cable.

WARNING

When measuring capacitance, to avoid injury or meter damage, turn off the power to the circuit to measured discharge all capacitors

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Continuity Measurement:

- ① Rotate function selection switch to continuity measurement position, and turn off the power to the circuit to be tested
- ② If needed, press “FUNC” key to select continuity measurement function
- ③ Connect black and red test probe to COM input jack and VΩmA input jack, respectively.
- ④ Measure the circuit to be tested with other ends of test probes.
- ⑤ If the measured circuit resistance is less than about $50\pm 20\Omega$, the buzzer will sound continuously.

WARNING

When measuring resistance or circuit continuity, to avoid injury or meter damage, turn off the power to the circuit to be measured and discharge all capacitors.

Diode Test:

- ① Rotate the function selection switch to diode position, and turn off the power to the circuit to be tested
- ② Connect the black and red test probe to COM input jack and VΩmA input jack, respectively.
- ③ Connect black and red test probe to cathode and anode of the diode to be tested, respectively.

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- ④ The meter will display the diode's forward bias voltage value. If the test probe polarity is reversed, the meter will display "OL", which distinguishes the diode's cathode and anode.

⚠ WARNING

When measuring diodes, to avoid injury or meter damage, turn off the power to the circuit and discharge all capacitors.

Frequency/Duty Ratio Measurement

- ① Rotate function selection switch to frequency/duty ratio measurement position.
- ② Press "FUNC" key to select frequency or duty ratio measurement function.
- ③ Connect black and red test probe to COM input jack and VΩmA input jack, respectively.
- ④ Measure the circuit with the other ends of test probes.
- ⑤ Read the measured result from LCD display.

⚠ WARNING

Don't input the voltage higher than 60V DC or 30V AC in frequency/duty ratio measurement position to prevent electric shock or meter damage.

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Temperature Measurement

- ① Rotate function selection switch to temperature (select Celsius degree or Fahrenheit degree as required) measurement position.
- ② Connect negative and positive end of K-type thermocouple to COM input jack and VΩmA input jack.
- ③ Place K-type thermocouple to the object or environment to be measured.
- ④ Read the measured result from LCD display.

⚠ WARNING

Don't input the voltage higher than 30V in temperature measurement position, to prevent electric shock or meter damage.

General Specifications

- Operating environment and condition: 600V CAT III, pollution grade: II.
- Elevation < 2000 m
- Environment temperature and humidity: 0~40°C, <80% RH (do not use meter when temperature <10°C).
- Storage temperature and humidity: -10~60°C, <70% RH (remove the battery).
- Temperature coefficient: 0.1xAccuracy/°C (<18°C or >28°C).
- The maximum allowable voltage between measurement end and ground: 600V DC or 600V AC RMS.

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- Fuse protection: grade mA: FF 400mA H 600V
grade 10A: FF 10A H 600V
- Sampling rate: about 3 times/s.
- Display: 3 3/4 bits of digit LCD display.
- Over-range indication: LCD will show "OL".
- Low battery indication: When the battery voltage is lower than the normal operating voltage, "⎓" will display on the LCD display.
- Input polarity indication: automatically display "-" symbol.
- Power supply: DC 2x1.5VAAA batteries.

Accuracy Indicators

Accuracy: \pm (% of reading + digits) with one year of warranty.

Reference conditions: environmental temperature is from 18°C~28°C, relative humidity is not more than 80%.

DC Voltage

Measuring range	Resolution	Accuracy
400mV	0.1mV	$\pm(0.5\% \text{ of reading } + 3 \text{ digits})$
4V	0.001V	
40V	0.01V	
400V	0.1V	
600V	1V	

Input impedance: 10M Ω

Maximum input voltage: 600V DC or AC (RMS)

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AC Voltage

Measuring range	Resolution	Accuracy
4V	0.001V	$\pm(1.2\% \text{ of reading } + 5 \text{ digits})$
40V	0.01V	
400V	0.1V	
600V	1V	

Input impedance: 10M Ω

Maximum input voltage: 600V DC or AC (RMS).

Frequency response: 40Hz~400Hz, sine wave RMS (average response).

Resistance

Measuring range	Resolution	Accuracy
400 Ω	0.1 Ω	$\pm(0.8\% \text{ of reading } + 5 \text{ digits})$
4k Ω	0.001k Ω	
40k Ω	0.01k Ω	
400k Ω	0.1k Ω	
4M Ω	0.001M Ω	
40M Ω	0.01M Ω	

Overload protection: 600V DC or AC (RMS)

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Capacitance

Measuring range	Resolution	Accuracy
5nF	0.001nF	±(3.0% of reading +5 digits)
50nF	0.01nF	
500nF	0.1nF	
5μF	0.001μA	
50μF	0.01μA	
100μF	0.1μA	

Overload protection: 600V DC or AC (RMS)

Diode and Continuity Measurement

Function	Measuring range	Resolution	Accuracy
Diode Test ➔	1.5V	0.001V	Display approximate diode forward voltage drop value.
🔊)	When built-in buzzer sounds, the resistance to be tested is less than 50±20Ω.		Open circuit voltage: about 0.5V
Overload protection: 600V DC or AC (RMS)			

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DC Current

Measuring range	Resolution	Accuracy
400μA	0.1μA	±(1.0% of reading +5 digits)
4000μA	1μA	
40mA	0.01μA	
400mA	0.1μA	
10A	0.01A	±(2.0% of reading +10digits)

Overload protection: grade mA: FF 400mA H 600V protection; grade 10A: FF 10A H 600V protection.
Maximum input current: grade mA: 200mA DC or AC RMS; grade 10A: 10A DC or AC RMS

When measured current is greater than 2A, the continuous measurement time cannot be more than 2 minutes. Disconnect the current and wait 10 minutes before making another measurement.

AC Current

Measuring range	Resolution	Accuracy
400μA	0.1μA	±(1.2% of reading +5 digits)
4000μA	1μA	
40mA	0.01μA	
400mA	0.1μA	
10A	0.01A	±(2.5% of reading +10digits)

Overload protection: grade mA: FF 400mA H 600V protection; grade 10A: FF 10A H 600V protection.
Frequency response: 40Hz~400Hz, sine wave RMS (average response)

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Maximum input current: grade mA: 200mA DC or AC RMS; grade 10A: 10A DC or AC RMS

When measured current is greater than 2A, the continuous measurement time cannot be more than 2 minutes. Disconnect the current and wait 10 minutes before making another measurement.

Frequency

Through grade HZ/DUTY:

Measuring range	Resolution	Accuracy
9.999Hz	0.001Hz	±(1.5% of reading + 5 digits)
99.99Hz	0.01Hz	
999.9Hz	0.1Hz	
9.999KHz	0.001KHz	
99.99KHz	0.01KHz	
999.9KHz	0.1KHz	
9.999MHz	0.001MHz	

- Overload protection: 250V DC or AC RMS.
- The input voltage range: $\geq 2V$ (input voltage will increase when the frequency to be measured increases).

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Through grade V or A:

Measuring range	Resolution	Accuracy
99.99Hz	0.01Hz	± (1.5% of reading + 5 digits)
999.9Hz	0.1Hz	
9.999kHz	0.001KHz	

- Measuring scope: 40Hz ~ 10kHz
- The input voltage range: $\geq 600mV$ AC RMS (input voltage will increase when the frequency to be measured increases)
- Input impedance: 10M Ω
- Maximum input voltage: 600V AC RMS

Duty Ratio

Measuring range	Resolution	Accuracy
0.1%-99.9%	0.1%	±2%

Through grade HZ/DUTY:

- Frequency response: 1~10MHz
- The input voltage range: $\geq 2V$ AC RMS (input voltage will increase when the frequency to be measured increases)
- Maximum input voltage: 250V AC RMS

Through grade V or A:

- Frequency response: 40 ~ 10kHz
- Input voltage range: $\geq 600mV$ AC
- Input impedance: 10M Ω
- Maximum input voltage: 600V AC RMS

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Temperature

Measuring range	Resolution	Accuracy
-20~1000°C	1°C	±(3.0% of reading +3°C)
-4~1832°C	1°F	±(3.0% of reading +3°F)

Overload Protection: FF 400mA H 600V protection

Maintenance

This section provides basic maintenance information, including instructions for the replacement of fuse and battery. Do not try to repair the meter unless you are an experienced maintenance person with the relevant calibration, performance testing and maintenance data.

General Maintenance

WARNING

To avoid injury or damage to the meter, don't wet the inner parts of the meter. Before opening the case or battery cover, remove the connecting cable between the test probe and the input signal.

Regularly clean the meter case with damp cloth and a small amount of detergent. Do not use abrasives or chemical solvents. If the input jack becomes dirty or wet, it may affect the measurement readings.

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To clean input socket:

- ① Turn off the meter and pull out all the test probes from the input jack.
- ② Remove all dirt from the jacks.
- ③ Apply detergent or lubricant to a new cotton ball (such as WD-40).
- ④ Clean each jack with a cotton ball and lubricant to prevent contamination by moisture in the socket.


Replace Battery

WARNING

To avoid electric shock, make sure that the test leads have been clearly move away from the circuit under measurement before opening the battery cover of the meter.

WARNING

Do not mix old and new batteries. Do not mix alkaline, standard (carbon-zinc), or rechargeable (ni-cad, ni-mh, etc) batteries.

If the sign “ ” appears, it means that the batteries should be replaced.

Loosen the fixing screw of the battery cover and remove it. Replace the exhausted batteries with new ones. Put the battery cover back and fix it again to its original form.

Note:

Do not reverse the polarity of the batteries.

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Replace Fuse

WARNING

To avoid electric shock or personal injury, before opening back cover to replace fuse, turn off the meter and disconnect the test probe from the measurement circuit.

To replace fuse:

- ① Turn off the power to the meter.
- ② Remove all test probes from the input jacks.
- ③ Loosen screws on the back cover with screwdriver.
- ④ Remove the back cover.
- ⑤ Remove the blown fuse.
- ⑥ Replace with new fuse with the same type.
- ⑦ Put the back cover and tighten the screws.

Replace the Probe

If insulation on probe is damaged, replace it.

WARNING

Use meet EN 61010-031 standard, rated CAT III 600V, 10A or better probe.

Accessories

- | | |
|--------------------|------|
| • Test Leads | 1set |
| • Package | 1pcs |
| • 1.5V AAA Battery | 2pcs |
| • User's Manual | 1pcs |

