



MT870

True RMS Digital Multimeter

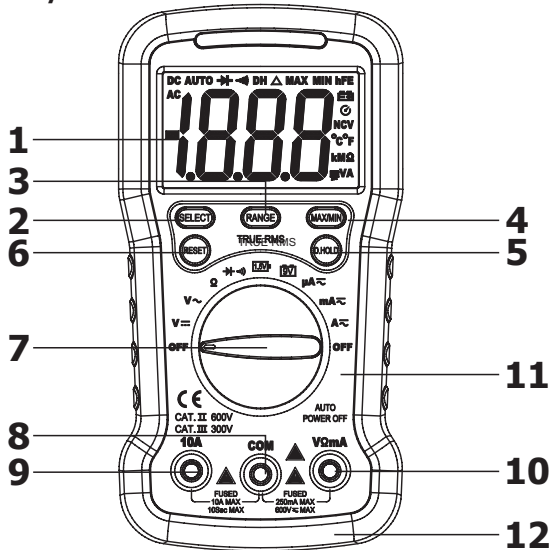
INTRODUCTION

The MT870 multimeter is a slim sized, portable, robust drop proof digital multimeter. The MT870 has a 2000 count digit LCD monitor with large 25mm digits that offer clear and easy reading. The circuitry design is centred on large-scale IC A/D converters in conjunction with an over-load protection circuit, the meters offers excellent performance and is ideal for a handy digital multimeter.

The meters can be used to measure DC & AC True RMS voltage, DC & AC True RMS current, resistance, battery test, diode test and audible continuity. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

This Equipment 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.

Panel Layout



1. LCD display: 3 1/2 digits LCD display, full function symbol display.
2. **SELECT** key: This key works on the " " range, press the key to choose diode or continuity test, on the current range, change to DC or AC. If you press and hold the "SELECT" key to power on, "Auto Power Off" function will be disabled.
3. **RANGE** Key: Press the "RANGE" key, the meter enters manual range mode, press it more than 2 seconds again, return to auto mode.
4. **MAX/MIN** key: Press the "MAX/MIN" key to lock **MAX** or **MIN** value, and the "MAX" or "MIN" sign will appear on the display, press it more than 2 seconds again to exit.
5. **D.HOLD** key: Press the "D.HOLD" key to lock display value, and the "DH" sign will appear on the display, press it again to exit.
6. **RESET** Key: Press the "RESET" key to reset the meter.
7. **Rotary Switch**: Use this switch to select functions and ranges.
8. **COM**: COM " " Input Jack
9. **10A**: 10A Input Jack
10. **AΩmA**: VμA, mA, BATT/Ω/ " " Input Jack
11. Meter casing
12. Protective casing

Safety Information

1. The meter is designed according to IEC61010-1 concerning electronic measuring instruments with an over-voltage category 600V (CAT II) or 300V (CAT III) and pollution 2.
2. Follow all safety and operating instructions to ensure that the meter is used safely and is kept in good operating condition.
3. Safety symbols:



Important safety information, refer to the operating manual.



Dangerous voltage may be presence.



Double insulation (protection Class II)

Special Cautions for Operation

1. The meters can be safe only according to standard procedures when used in conjunctions with the supplied test leads. Please replace damaged test leads with the same electric specifications.
2. To avoid risk of electric shock, do not use the meter if the casing has been opened.
3. The range switch should be right position before making a measurement.
4. To avoid electric shock and damaging the instrument, the input signals must not exceed the specified limits.
5. When measuring TV set or switched power, attention should be paid to the possible pulses that may cause damage to the circuitry.
6. Range switch position must not be changed at random during measurement.
7. Take caution against shock in the course of measuring voltage higher than DC 60V & AC 30V.
8. Protection fuse should be replaced only with same type and same specification.
9. Verify the multimeter's operation by measuring a known voltage.
10. After operation is finished, set function switch at OFF to save battery power.
11. If the meter is without usage for long time, take out the battery to avoid damage by battery leakage.

General Specifications

1. Max Voltage between input terminal and Earth Ground: CAT II 600V or CAT II 300V.
2. Over-range Indication: display "OL" for the significant digit.
3. Automatic display of negative polarity "-".
4. Low Battery Indication: " " displayed.
5. Display: 3 1/2 digit LCD with a max. reading of 1999.
6. Auto range & manual range control.
7. Auto Power Off: When measurement exceeds 15 minutes without switching mode and pressing key, the meter will switch to standby mode. Press any key to exit standby mode. When restart the system, press and hold **SELECT** key to disable auto power off.
8. Fuse protection: 250mA/600V Fast Fuse, 10A/600V Fast Fuse.
9. Power supply: 1.5Vx2 "AA" R6P battery
10. Operating Temp.: 0°C to 40°C (relative humidity <85%)
11. Storage Temp.: -10°C to 50°C (relative humidity <85%)
12. Guaranteed precision Temp.: 23±5°C (relative humidity <70%)
13. Dimension: 150 x 100 x 36mm
14. Weight: approx. 250g (including battery)

Testing Specifications

Accuracy is specified for a period of year after calibration and at 18°C to 28°C (64°F to 82°F) with relative humidity to 70%.

DC Voltage

Range	Resolution	Accuracy
200mV	0.1mV	±(0.5% of rdg + 2 digits)
2V	1mV	
20V	10mV	
200V	100mV	
600V	1V	±(0.8% of rdg + 2 digits)

* Impedance: 10MΩ, More than 100MΩ on 200mV range

* Overload protection: 600V DC or AC rms

AC Voltage

Range	Resolution	Accuracy
2V	1mV	±(0.8% of rdg + 3 digits)
20V	10mV	
200V	100mV	
600V	1V	±(1.2% of rdg + 3 digits)

* AC True RMS

* Impedance: 10MΩ

* Overload protection: 600V DC or AC rms

* Frequency Range: 40 to 2kHz

DC Current

Range	Resolution	Accuracy
200μA	0.1μA	±(1.2% of rdg + 2 digits)
2000μA	1μA	
20mA	10μA	
200mA	100μA	
2A	1mA	±(2.0% of rdg + 3 digits)
10A	10mA	

* Overload protection: 250mA/600V Fast Fuse 10A/600V Fast Fuse, 10A up to 10 seconds

AC Current

Range	Resolution	Accuracy
200μA	0.1μA	±(1.5% of rdg + 3 digits)
2000μA	1μA	
20mA	10μA	
200mA	100μA	
2A	1mA	±(2.5% of rdg + 5 digits)
10A	10mA	

* AC True RMS

* Overload protection: 250mA/600V Fast Fuse

10A/600V Fast Fuse, 10A up to 10 seconds

* Frequency Range: 40 to 2kHz

Resistance

Range	Resolution	Accuracy
200Ω	0.1Ω	±(1.0% of rdg + 3 digits)
2kΩ	1Ω	
20kΩ	10Ω	
200kΩ	100Ω	
2MΩ	1kΩ	±(1.5% of rdg + 3 digits)
20MΩ	10kΩ	

* Overload protection: 600V DC or AC rms

Battery Test

Range	Accuracy	Load current	Resolution
1.5V	±(5.0% of rdg + 5 digits)	Approx. 50mA	1mV
9V		Approx. 10mA	10mV

* Overload protection: 250mA/600V Fast Fuse

Diode and Audible continuity test

Range	Description	Test Condition
	Display read approximately forward voltage of diode	Forward DC current approx. 0.5mA Reversed DC voltage approx. 2.2V
	Built-in buzzer sounds if resistance is less than 50Ω	Open circuit voltage approx. 2V

* Overload protection: 600V DC or AC rms

Operating Instructions

Attention before operation

1. Check battery. When the battery voltage drops below a proper operation range, the symbol will appear on the LCD display and the battery needs to be replaced.
2. Pay attention to the besides the input jack which shows that the input voltage or current should be within the specified value.
3. The range switch should be positioned to desired range for measurement before operation.

Measuring DC & AC Voltage

1. Connect the black test lead to **COM** jack and the red to **VΩmA** jack.
2. Set the rotary switch at the desired "**V**" range position, it shows symbol for testing DC voltage, if you want to test AC voltage, push "**SELECT**" button switch.
3. Connect test leads across the source or load under measurement.
4. You can get the voltage reading from LCD. The polarity of the red lead connection will be indicated along with the DC voltage value.

Note:

1. " means you can't input the voltage more than 600V, it's possible to show higher voltage, but it may damage the inner circuit.
2. Be cautious against shock when measuring high Voltage.

Measuring DC & AC Current

1. Connect the black test lead to **COM** jack and the red to the **VΩmA** jack for a maximum 200mA current, for a maximum 2A or 10A current, move the red lead to the **10A** jack.
2. Set the rotary switch at the desired "**uA**" & "**mA**" & "**A**" range position, it shows symbol for testing DC current, if you want to test AC current, push "**SELECT**" button switch.
3. Connect test leads in series with the load under measurement.
4. You can get the amperage reading from LCD. The polarity of the red lead connection will be indicated along with the DC current value.

Note:

1. When the value scale to be measured is unknown beforehand, set the range selector at the highest position.
2. When only "OL" is displayed, it indicates over-range situation and the higher range has to be selected.

3. " means the socket mA's maximum current is 250mA and 10A's maximum current is 10A, over 250mA or 10A current can be protected by the fast fuse.
4. On the 10A range, the measuring time should be less than 10 seconds to prevent precision from affecting by circuit heating.

Measuring Resistance

1. Connect the black test lead to **COM** jack and the red to **VΩmA** jack.
2. Set the rotary switch at the desired "**Ω**" range position.
3. Connect test leads across the resistance under measurement.
4. You can get the resistance reading from LCD.

Note: Max. input overload: 600V rms<10sec

1. For measuring resistance above 1MΩ, the meter may take a few seconds to stabilize.
2. When the input is not connected, i.e. at open circuit, the figure 'OL' will be displayed for the over-range condition.
3. When checking in-circuit resistance, be sure the circuit under test has all power removed and that all capacitors have been fully discharged.

Battery Testing

1. Connect the black test lead to **COM** jack and the red to **VΩmA** jack.
2. Set the rotary switch at the desired " or " range position to test 1.5V or 9V battery.
3. Connect the red test lead to the positive of the battery and the black test lead to the negative of the battery.
4. You can get battery voltage reading from LCD.

Diode & Audible continuity Testing

1. Connect the black test lead to **COM** jack and the red to **VΩmA** jack.
2. Set the rotary switch at the " or " range position, push "**SELECT**" to choose **Diode** or **Audible continuity** measurement.
3. On **diode** range, connect the test leads across the diode under measurement, display shows the approx. forward bias voltage of this diode.
4. On **Audible continuity** range, connect the test leads to two point of circuit, if the resistance is lower than approx. 50Ω, the buzzer sounds.

Note:

Make sure all the power is removed and all capacitors need to be discharged under this measurement.

Battery replacement

1. When the battery voltage drops below the proper operation range the symbol will appear on the LCD display and the battery need to be replaced.
2. Before replacing the battery, set the selector switch to "**OFF**" position and remove the test leads from the terminals. Open the cover of the battery cabinet with a suitable screwdriver.
3. Replace the old battery with the same type of battery (AA R6P 1.5V×2).
4. Close the cover of the battery cabinet and fasten the screw.

Fuse replacement

1. This meter is provided with a 250mA/600V fast fuse to protect the battery test and the current measuring circuits which measure up to 200mA, with a 10A/600V fuse to protect the 10A range.
2. Ensure the meter is not connected to any external circuit, set the selector switch to "**OFF**" position and remove the test leads from the terminals. Open the cover of the battery cabinet with a suitable screwdriver.
3. Replace the old fuse with the same type and rating: 6×32mm 250mA/600V fast fuse or 6×32mm 10A/600V fast fuse.
4. Close the cover of the battery cabinet and fasten the screw.

Maintenance

1. You must replace the test leads if the insulation is broken and internal wire is exposed, use the same test leads with the same specifications.
2. Use only a moist fabric or small amount of detergent but not chemical solution for cleaning.
3. Do not use the meter before the back cover is properly closed and screw secured. If any problems are encountered, stop operation immediately and send the meter for maintenance.
4. Please remove the battery when not using for a long time.

Accessories

1. Test Leads: electric rating 600V 10A. If the test leads need to be replaced, you must use a new one which should meet EN 61010-01 standard, rated CAT III 600V, 10A or better.
2. Operator's Manual

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