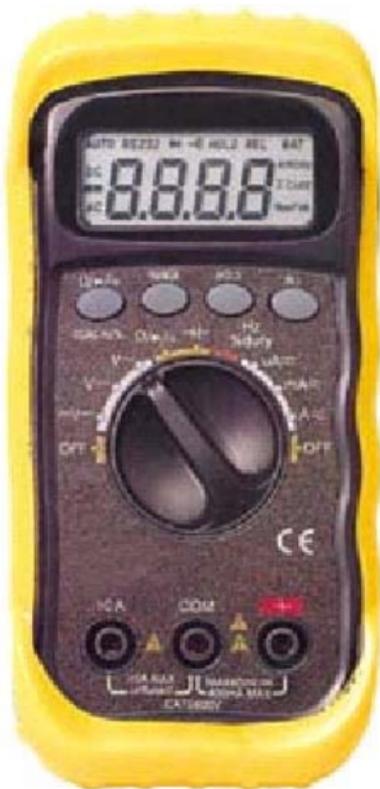


MODEL 57044

**OPERATING INSTRUCTION**  
***AUTORANGING MULTIMETER***



## **SAFETY INFORMATION**

The following safety information must be observed to insure maximum personal safety during the operation at this meter:

- Do not use the meter if the meter or test leads look damaged, or if you suspect that the meter is not operating properly.
- 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.
- Turn off power to the circuit under test before cutting, unsoldering, or breaking the circuit. Small amounts of current can be dangerous.
- Use caution when working above 60V dc or 30V ac rms, such voltages pose a shock hazard.
- When using the probes, keep your fingers behind the finger guards on the probes.
- Measuring voltage which exceeds the limits of the multimeter may damage the meter and expose the operator to a shock hazard. Always recognize the meter voltage limits as stated on the front of the meter.

## SAFETY SYMBOLS



Indicates operators must refer to the explanation in this manual.



Indicates terminals at which dangerous voltage may be present.

## SPECIFICATIONS

**Display:** 4000 counts LCD display with function indication.

**Polarity:** Automatic, (-) negative polarity indication.

**Over range:** “OL” mark indication.

**Low Battery Indication:** “BAT” is displayed when the battery voltage drops below the operating level.

**Measurement Rate:** 2 times per second, nominal.

**Auto Power Off:** Meter automatically shuts down after approx. 30 minutes of inactivity.

**Operating Environment:** 0 °C to 50 °C at < 70 % relative humidity.

**Storage Temperature:** -20 °C to 60 °C at < 80 % relative humidity.

**Power:** Two standard type size “AAA” 1.5V batteries, UM4.

**Dimensions:** 121.5 (H) x 60.6 (W) x 40 (D) mm.

**Weight: Approx.:** 260g including holster.

**Accuracy is given at 23 °C to 5 °C, less than 70 % RH.**

**DC Voltage (Auto-ranging)**

Range	Resolution	Accuracy
400.0mV	0.1mV	$\pm 0.8\%$ of rdg $\pm 2$ dgts
4.000V	1mV	$\pm 0.5\%$ of rdg $\pm 2$ dgts
40.00V	10mV	
400.0V	100mV	
600V	1V	$\pm 1.0\%$ of rdg $\pm 2$ dgts

**Input Impedance:** 10M $\Omega$ .

**Maximum Input:** 600V dc or 600V ac rms.

**AC Voltage (Auto-ranging except 400mV)**

Range	Resolution	Accuracy
400.0mV	0.1mV	$\pm 2.0\%$ of rdg $\pm 4$ dgts
4.000V	1mV	$\pm 1.5\%$ of rdg $\pm 3$ dgts
40.00V	10mV	
400.0V	100mV	
600V	1V	$\pm 2.0\%$ of rdg $\pm 4$ dgts

**Input Impedance:** 10M $\Omega$ .

**Frequency Range:** 40 to 400Hz, 40 to 200Hz for 400mV and 4V ranges.

**Maximum Input:** 600V dc or 600V ac rms.

**DC Current** (Auto-ranging for  $\mu\text{A}$  and  $\text{mA}$ )

Range	Resolution	Accuracy
400.0 $\mu\text{A}$	0.1 $\mu\text{A}$	$\pm 1.5\%$ of rdg $\pm 3$ dgts
4.000mA	1 $\mu\text{A}$	
40.00mA	10 $\mu\text{A}$	
400.0mA	100 $\mu\text{A}$	
10A	10mA	$\pm 2.0\%$ of rdg $\pm 5$ dgts

**Overload Protection:** 0.5A / 250V and 10A / 250V Fuse.

**Maximum Input:** 400mA dc or 400mA ac rms on  $\mu\text{A}$  / mA ranges, 10A dc or ac rms on 10A range.

**AC Current** (Auto-ranging for  $\mu\text{A}$  and  $\text{mA}$ )

Range	Resolution	Accuracy
400.0 $\mu\text{A}$	0.1 $\mu\text{A}$	$\pm 1.8\%$ of rdg $\pm 5$ dgts
4.000mA	1 $\mu\text{A}$	
40.00mA	10 $\mu\text{A}$	
400.0mA	100 $\mu\text{A}$	
10A	10mA	$\pm 3.0\%$ of rdg $\pm 7$ dgts

**Overload Protection:** 0.5A / 250V and 10A / 250V Fuse.

**Frequency Range:** 40 to 400 Hz, 40 to 200 Hz for 400 $\mu\text{A}$  and 4mA ranges.

**Maximum Input:** 400mA dc or 400mA ac rms on  $\mu\text{A}$  / mA ranges, 10A dc or ac rms on 10A range.

**Resistance (Auto-ranging)**

Range	Resolution	Accuracy
400.0 $\Omega$	0.1 $\Omega$	$\pm 0.8\%$ of rdg $\pm 4$ dgts
4.000k $\Omega$	1 $\Omega$	$\pm 0.8\%$ of rdg $\pm 2$ dgts
40.00k $\Omega$	10 $\Omega$	
400.0k $\Omega$	100 $\Omega$	
4.000M $\Omega$	1k $\Omega$	
40.00M $\Omega$	10k $\Omega$	$\pm 1.2\%$ of rdg $\pm 3$ dgts

**Input Protection:** 250V dc or 250V ac rms.

**Capacitance (Auto-ranging)**

Range	Resolution	Accuracy
40.00nF	10pF	$\pm 5.0\%$ of rdg $\pm 7$ dgts
400.0nF	0.1nF	$\pm 3.5\%$ of rdg $\pm 5$ dgts
4.000 $\mu$ F	1nF	
40.00 $\mu$ F	10nF	
200.0 $\mu$ F	0.1 $\mu$ F	$\pm 5.0\%$ of rdg $\pm 5$ dgts

**Input Protection:** 250V dc or 250V ac rms.

### Frequency (Auto-ranging)

Range	Resolution	Accuracy
9.999Hz	0.001Hz	$\pm 1.0\%$ of rdg $\pm 5$ dgts
99.99Hz	0.01Hz	
999.9Hz	0.1Hz	
9.999kHz	1Hz	$\pm 0.8\%$ of rdg $\pm 3$ dgts
99.99kHz	10Hz	
999.9kHz	100Hz	
9.999MHz	1kHz	$\pm 1.5\%$ of rdg $\pm 4$ dgts

**Sensitivity:** 0.8V RMS min. at  $>20\%$  and  $<80\%$  duty cycle.

**Effect Reading:** More than 100 digits at pulse width  $>2\mu\text{Sec}$ .

**Overload protection:** 250V dc or ac rms.

### Duty Cycle

Range	Resolution	Accuracy
0.1%~99.9%	0.1%	$\pm 1.2\%$ of rdg $\pm 2$ dgts

**Pulse width:**  $>100\mu\text{s}$ ,  $<100\text{ms}$ .

**Overload protection:** 250V dc or ac rms.

### Diode Test

Test current	Resolution	Accuracy
1 mA typical	1 mV	$\pm 10\%$ of rdg $\pm 5$ dgts

**Open circuit voltage:** 2.8V dc typical

**Overload protection:** 250V dc or ac rms.

### Audible continuity

**Audible threshold:** Less than  $30\Omega$ .

**Test current:**  $<0.7\text{mA}$ .

**Overload protection:** 250V dc or ac rms.

## **OPERATION**

Before taking any measurements, read the Safety Information Section.

Always examine the instrument for damage, contamination (excessive dirt, grease, etc.) and defects. Examine the test leads for cracked or frayed insulation. If any abnormal conditions exist do not attempt to make any measurements.

### ***AC/DC OR OHM/DIODE/CONTINUITY OR Hz/% SELECTING BUTTON:***

Push this button to select **AC/DC** current measuring function when the function switch is set at  $\mu$ A, mA, and A positions.

Push this button to select **OHM/DIODE/CONTINUITY** measuring function when the function switch is set at **OHM/DIODE/ CONTINUITY** position.

Push this button to select **Hz/%** (Duty Cycle) measuring function when function switch is set at **Hz/%** Duty Cycle position.

### ***RANGE CONTROL BUTTON:***

This is the manual range setting switch.

When power is first switched on, auto-ranging is automatically selected.

Whenever this switch is pressed, manual range setting is possible. Pressing the button once switches to the manual ranging mode and **RANGE** mark is displayed.

#### **Subsequent Button**

When the highest range is reached, the next press returns the instrument to its lowest range. To cancel manual range, hold the range hold switch in for more than 1 second and the **RANGE** mark disappears and the auto-ranging function is restored (Manual range except capacitance and frequency).

### ***DATA HOLD BUTTON:***

When this button is pushed, the display will show the last reading and "**HOLD**" symbol will appear until pushing it again. Data holding will be canceled automatically when the function switch is rotated.

### ***RELATIVE ZERO BUTTON:***

For convenient readings, comparison & offset.

### ***FUNCTION / POWER SWITCH:***

Switch for changing the measurement function and power on and off.

### ***INPUT JACKS:***

This meter has three input jacks that are protected against overload to the limits except 10A. During use, connect the black test lead to the **COM** jack and the red test lead as shown below:

<b>Function</b>	<b>Red lead Connection</b>	<b>Input limits</b>
mV DC	“+”	600V dc or ac rms.
DCV/ACV	“+”	600V dc or ac rms.
$\Omega$ /CONTINUITY/DIODE	“+”	250V dc or ac rms
CAP/Hz/%	“+”	250V dc or ac rms
$\mu$ A/mA	“+”	400mA dc or ac rms.
A	“10A”	10A dc or ac rms.

## **MEASURING VOLTAGE**

1. Connect the black test lead to the COM jack and red lead to the “+” jack.
2. Set the function at mV DC DCV or ACV range to be used and connect test leads across the source or load under measurement.
3. Read LCD display. The polarity of red connection will be indicated when making a DC measurement.

## MEASURING CURRENT

1. Connect the black test lead to the **COM** jack and the red test lead to the “+” jack for a maximum of 400mA. For a maximum of 10A, move the red lead to the “10A” jack.
2. Set the function switch at  $\mu\text{A}$ , mA or A range to be used and push DC/AC button to select DCA or ACA measuring mode.
3. Connect test leads in series with the load in which the current is to be measured.
4. Read **LCD** display, the polarity of red lead connection will be indicated when making a DC measurement.

## MEASURING RESISTANCE

1. Connect the black test lead to the **COM** jack and the red test lead to the “+” jack.
2. Set the function switch to  **$\Omega$ /DIODE/CONTINUITY**.
3. Make sure all the power of the circuit to be measured is off.
4. Connect the test leads to the circuit to be measured. The range will change automatically, and will hold on the range that will display the measured resistance with the best resolution.
5. The value indicated on the display is the measured value of resistance with proper decimal point and annunciation indication.

## DIODE TEST

1. Connect the black test lead to the **COM** jack and the red test lead to the “+” jack.
2. Set the function switch to **OHM/DIODE/CONTINUITY** ( $\Omega$  /  /  $\bullet$ )).
3. Make sure all the power is OFF.
4. To select diode test, touch the mode selection switch (**OHM/DIODE/CONTINUITY**) and the "**DIODE**" mark is indicated in the left side on the display. This is diode check mode.

When you touch the switch again, the mode changes to the continuity test mode.

5. Next, connect the test leads to the diode be tested. When measuring the forward voltage across diode a normal diode will indicate 0.4V to 0.7V and the reverse voltage will indicate "OL" (same as on open condition).

For a short-circuited diode, a value near 0 mV will be displayed.

## CONTINUITY CHECK

1. Connect the black test lead to the **COM** jack and the red test lead to the “+” jack.
2. Set the function switch to **OHM/DIODE/CONTINUITY**.
3. To select continuity test, touch the mode selection switch (**OHM/DIODE/BUZZER**) and the "( $\bullet$ ))" mark is indicated in the left side on the display. This is continuity check mode. In the continuity mode, a buzzer sounds when the resistance of the circuit to be measured is less than approx.30  $\Omega$ .

## MEASURING CAPACITANCE

1. Connect the black test lead to the **COM** jack and the red test lead to the “+” jack. (**NOTE:** The polarity of the lead connection is positive "+").
2. Connect test leads across the capacitor under measurement and be sure that the polarity of connection is observed.

### **NOTE:**

1. When checking in-circuit capacitance, be sure that the circuit has all power removed and all capacitors are fully discharged.
2. The range control mode in capacitance measurement is auto-ranging.

## MEASURING FREQUENCY

1. Connect the black test lead to the **COM** jack and the red test lead to the “+” jack.
2. Set the function switch to "**Hz/% Duty**" range.
3. Connect the test leads to the circuit to be measured. The range will change to display the measured frequency with the best resolution.

When you push the “**HZ/%**” Button, the mode changes to the duty cycle check mode.

### **NOTE :**

The input voltage should be between 800mV and 10V rms.ac. If the voltage is more than 10V rms., reading may be out of the accuracy range.

## **MEASURING DUTY CYCLE**

1. Connect the black test lead to the **COM** jack and the red test lead to the “+” jack.
2. Set the function switch to "**Hz/% Duty**".
3. Push the “**Hz/%**” button changing the function to **% Duty Cycle**.
4. Connect the test leads to the circuit to be measured. The range will change to display the measured duty cycle with the best resolution.

### **NOTE:**

The input voltage should be between 800mV and 10V rms. ac.

If the voltage is more than 10V rms., reading may be out of the accuracy range.

## **BATTERY AND FUSE REPLACEMENT**

If the sign “**BAT**” appears on the **LCD** display, it indicates that the battery should be replaced. Remove screws on the back cover and open the case. Replace the exhausted battery with new batteries. (2 x “AAA” 1.5V batteries, UM4)

Fuse rarely needs replacement and blows almost always as a result of the operator’s error. Open the case and replace the blown fuse with ratings specified.

### **WARNING:**

Before attempting to open the case, be sure that test leads have been disconnected from measurement circuit to avoid electric shock hazard.

Replace fuse only with specified ratings:

Fuse: F1 500mA / 250V fast blow, F2 10A / 250V fast blow.