

# Model Q 1074A - OPERATION MANUAL


## 6000 COUNT AUTO RANGE & AUTO POWER OFF DIGITAL MULTIMETER

*This LCD Auto Range & Auto Power off digital multimeter is a portable, compact, 6000 COUNT digits with multimeter. It is ideally suited for field, lab, shop, car, and home applications.*

### Safety Information

#### **Warning**

To avoid possible electric shock or personal injury, follow these guidelines:

- Do not use the meter if it is damaged. Before you use the meter, inspect the case. Look for cracks or missing plastic. Pay particular attention to the insulation surrounding the connectors.
- Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads before you use the meter.
- The RESPONSIBLE BODY shall be made aware that, if the device is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- Do not use the meter if it operates abnormally. Protection may be impaired. When in doubt, have the meter serviced.
- Do not operate the meter around explosive gas, vapor, or dust.
- Do not apply more than the rated voltage, as marked on the meter, between terminals or between any terminal and earth ground.
- Before use, verify the meter's operation by measuring a known voltage.
- When measuring current, turn off circuit power before connecting the meter in the circuit. Remember to place the meter in series with the circuit.
- When servicing the meter, use only specified replacement parts.
- Use caution when working above 30 V ac rms, 42 V peak, or 60 V dc. Such voltages pose a shock hazard.
- The finger or any part of your body shall not be beyond the barrier of the test probe when measuring.
- Avoid working alone.
- When using the probes, keep your fingers behind the finger guards on the probes.
- Connect the common test lead before you connect the live test lead. When you disconnect test leads, disconnect the live test lead first.
- Remove test leads from the meter before you open the battery door.
- Do not operate the meter with the battery door or portions of the cover removed or loosened.
- To avoid false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as the low battery indicator () appears.
- Use only 1 standard 9V battery (NEDA 1604, IEC 6F22 or equivalent), properly installed in the meter case, to power the meter.
- To avoid the potential for fire or electrical shock, do not connect the thermocouples to electrically live circuits.
- In locations subject to radio frequency interference, the products may malfunction and it resets automatically when leaving this environment.











#### **Caution**

To avoid possible damage to the meter or to the equipment under test, follow these guidelines:

- Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, diodes, or capacitance.
- Use the proper terminals, function, and range for your measurements.
- Before measuring current, check the meter's fuses and turn power OFF to the circuit before connecting the meter to the circuit.



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## International Electrical and Relative Symbols

	AC (Alternating Current)		Important information
	DC (Direct Current)		Caution risk of electric shock
	European Safety Standard		Earth ground
	Double insulated		Low Battery Indicator
	The symbol indicating separate collection for electrical and electronic equipment.		US Safety Standard.

## 1. SPECIFICATIONS

### 1.1 GENERAL SPECIFICATIONS

Display	6000 Count LCD display. Max reading is 6000.
Range control	Auto range / Manual range control
Polarity	Automatic negative polarity indication.
Zero adjustment	Automatic.
Over range indication	The "OL" display.
Low battery	The "  " is display when the battery voltage is low.
Auto Power Off	10 minutes after stopping the switch, or not pressing any operation button, the meter automatically enters to power off mode.
Safety standards	 <b>EMC/LVD</b> . The meter is up to the standards of IEC1010 Pollution Degree 2, Overvoltage Category III.
Operating environment	Temperature 32 to 104°F (0°C to 40°C), humidity < 80% RH.
Storage environment	Temperature -4 to 140°F (-20°C to 60°C), humidity < 90% RH.
Power	One standard 9 volt battery (NEDA 1604, IEC 6F22 or equivalent)
Dimension	98(W)×177(H)×39(D) mm
Weight	Approx. 300g (including battery).

### 1.2 ELECTRICAL SPECIFICATIONS

Accuracy is  $\pm$  (% of reading + number in last digit) at  $23 \pm 5^\circ\text{C}$ , <75% RH.

#### DC Voltage

60mV, 600mV, 6V, 60V	$\pm ( 0.2\%+2 )$
600V	$\pm ( 0.3\%+2 )$
Impedance	10M $\Omega$
Overload protection	600V DC/AC RMS.

#### AC Voltage

600mV, 6V, 60V	$\pm ( 1.0\%+3 )$
600V	$\pm ( 1.5\%+3 )$
Impedance	10M $\Omega$ .
Frequency response	50 ~ 1KHz
Overload protection	600V DC/AC RMS.

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## Resistance

600Ω, 6kΩ, 60kΩ, 600KΩ, 6MΩ	± ( 0.5%+2 )
60MΩ	± ( 1.0%+3 )
Overload protection	250V DC/AC RMS.

## DC Current

600uA,6000uA ,60mA, 600mA	± (0.5%+3)
Overload protect : Fast fuse 0.8A/600V	
<b>Note - Not to measure a current in a circuit</b>	<b>with voltage more than 600V.</b>
10A	± (0.8%+5)
10A for 15sec each.	15min maximum
Overload protect	Fast fuse 10A/600V
Input voltage drop	≤0.3V.
<b>Note - Not to measure a current in a circuit</b>	<b>with voltage more than 600V.</b>

## AC Current

6000uA , 600mA	± (1.5%+4)
Overload protect	Fast fuse 0.8A/600V
<b>Note - Not to measure a current in a circuit</b>	<b>with voltage more than 600V.</b>
10A	± (2.0%+5)
10A for 15sec each.	15min maximum
Overload protect	Fast fuse 10A/600V.
Input voltage drop	≤0.3V.
Frequency Respond	50Hz – 1KHz
<b>Note - Not to measure a current in a circuit</b>	<b>with voltage more than 600V.</b>

## Capacitance

1nF,10nF, 100nF, 1 μ F, 10 μ F,100 μ F, 1000 μ F,10mF,100mF	± (5% +10)
Overload protection	250V DC/AC RMS.

## Temperature

-50°C - 150°C	±(3°C+1) (Use build-in temperature sensor)
-58°F - 302°F	±(5°F+2)
150°C - 700°C	±3%±1°C
302°F - 1292°F	±3%±2°F
Overload protection	250V DC/AC RMS

## Frequency

9.999Hz -10MHz	± (0.1%rdg+5)
Sensitivity	≤100kHz - 1.5V RMS; >100kHz - 5V RMS
Overload protect	250V RMS

## Duty Cycle

0.1~99.9%	± (2% rdg +5) @ Frequency less than 10kHz
Overload Protection	250V DC/AC RMS

## Diode Test

Test current	1±0.6mA; Test voltage - Approx. 2.8V
Overload protection	250V DC/AC RMS

## Continuity Test

Audible indication	< 120 Ω Approx.
Overload protection	250V DC/AC RMS

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## 2. OPERATION

### **WARNING**

- 1) When measuring voltage ensure that instrument is not connected or switched to resistance range. Always ensure that the correct terminals are used for the type of measurement to be made.
- 2) Use extreme care when measuring voltage above 50V, especially from sources where high energy is existed.
- 3) Avoid making connections to "live" circuits whenever possible.
- 4) When making current measurements ensure that the circuit not "live" before opening it in order to connect the test leads.
- 5) Before making resistance measurements or diode test, ensure that the circuit under test is de-energized.
- 6) Always ensure that the correct function and range is selected. If in doubt about the correct range to use, start with the highest and work downwards.
- 7) Extreme care should be taken when using the instrument to conjunction with a current transformer connected to the terminals if an open circuit occurs.
- 8) Ensure that the test leads and probes are in good condition with no damage to the insulation.
- 9) Take care not to exceed the over-load limits as given in the specifications.
- 10) Before opening the case of the instrument to replace battery or fuse, disconnect the test leads from any external circuit, set the selector switch to "OFF" position.

### 2.1 Function Press Button

- 1) **SELECT** (State choice)


There are several functions at one rotary switch position, press **SELECT** button to select function you want, It allowable to select AC or DC voltage, AC or DC current, Resistance, Diode or Audible continuity, °C or °F temperature measurement.


- 2) **RANGE** (Range selection)

When power on, meter at auto range mode, press RANGE button you can select measurement range you want. Range is run up with times of pressing RANGE button until its max, then return the min range. Press RANGE button more than 2 seconds, the meter return to auto range. This button do not effect on frequency, duty cycle, capacitance, diode & continuity test and temperature measurement.

- 3) **REL/RS232** (Relative Measurement / RS232 enable)

Press this button the meter enter relative measuring state and "Δ" symbol appear on LCD. The result of the relative measurement is the difference between measuring value and reference value. The reference value is produced same as momentary reading value when pressing this button, press it again to exit this state and "Δ" symbol disappear on display, and this button do not effect on frequency, diode and continuity test function. Press this button less than 2 seconds the meter enter relative measuring state and "Δ" symbol appear on LCD. The secondary function of "REL/RS232" button is RS232 communication enable and disable. If you press it more than 2 seconds, the RS232 will be started and press it more than 2 seconds again will cancel RS232 communication.

- 4)  (Data Hold / Backlight)

Press this button less than 2 seconds the meter enter data hold mode and "HOLD" symbol appear on LCD, and the momentary value while pressing the button display on LCD. Press it again to exit this mode and "HOLD" symbol disappear on display. As data hold function, this button do not effect on diode and continuity test function. The secondary function of  button is backlight enable and disable. If you press it more than 2 seconds, the backlight will be turn on and press it more than 2 seconds again will make the backlight off.

- 5) **Hz/DUTY** (Frequency and Duty Cycle measurement switch button)

When you make frequency, AC voltage or AC current measurement, press this button to switch Hz or duty cycle test mode.


- 6) **MAX/MIN** (Maximum value / Minimum value)

Press **MAX/MIN** button the meter enter Maximum value / Minimum value record mode and "MAX" / "MIN" symbol appear on LCD, the LCD will display the maximum value or minimum value science



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pressing the button always. Press **MAX/MIN** more than 2 seconds button again to exit this mode and "MAX" / "MIN" symbol disappear on display. This button do not effect on diode and continuity test function, capacitance measurement, frequency measurement.



## 2.2 Check the 9-volt battery.

- If the battery is weak, a  " symbol will appear on the left of the display. It means that the battery should be replaced.

## 2.3 DC and AC Voltage measurement

- 1) Connect the black test lead to "COM" socket and red test leads to the "V/Ω/→↻/Hz" socket.
- 2) Set the selector switch to " V" or " mV" position, and press **SELECT** to select DCV or ACV measuring mode.
- 3) Connect the probes across the source or load under measurement.

## 2.4 DC and AC Current measurement

- 1) Connect the black test lead to "COM" socket and red test leads to the "uA / mA" socket.
- 2) For measurement up to 6000uA. Set the selector switch to " uA" position and press **SELECT** button to select DC or AC current measuring mode.
- 3) For current measurement from 6mA to 600mA. Set the selector switch to " mA" position and press **SELECT** button to select DC or AC current measuring mode.
- 4) For current measurement from 600mA to 10A, connect the red test lead to "10A" socket. Set selector switch to "AC/DC 10A" position and press **SELECT** button to select DC or ACA measuring mode.
- 5) Connect the probes across the source or load under measurement.



**Note1: Not to measure a current in a circuit with voltage more than 600V at uA/mA/10A.**

## 2.5 Resistance measurement

- 1) Connect the black test lead to "COM" socket and red test leads to the "V/Ω/→↻/Hz" socket.
- 2) Set the selector switch to "Ω →↻ →↻" position
- 3) Connect the probes across circuit to be tested.

**Caution: Ensure that the circuit to be tested is "dead". Max. input over-load: 250V RMS and <10sec.**

## 2.6 Diode, continuity test

- 1) Connect the black test lead to "COM" socket and red test leads to the "V/Ω/→↻/Hz" socket.
- 2) Set the selector switch to "Ω →↻ →↻" position and press **SELECT** button to select Diode  or continuity  test mode.
- 3) Connect the black and red test probe to the cathode (-) and anode (+) ends of diode to be tested respectively.
- 4) Read the forward voltage drop (junction) value from the display. If reverse connected the probes to diode, display shows over-load.
- 5) In Continuity test, the beeper sounds continuously if the resistance is less than 120 approximately.

**Caution: Ensure that the circuit to be tested is "dead". Max. input over-load: 250V RMS and <10sec.**

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## 2.7 Capacitance measurement

- 1) Before testing, discharge the capacitor by shorting its leads together. Use caution in handling capacitors because they may have a charge on them of considerable power before discharging.
- 2) Connect the black test lead to "COM" socket and red test leads to the " V/Ω/→~) /Hz " socket.
- 3) Set the selector switch to "Ω →~) →" position.
- 4) Press **SELECT** button to choose Capacitance measurement.
- 5) Press "Δ" button, you can use the relative function to eliminate the zero error.
- 6) Connect the probes across capacitor to be tested.

**Caution: Ensure that the circuit to be tested is "dead". Max. input over-load: 250V RMS. And <10sec.**

## 2.8 Temperature Measurement

- 1) Connect the black test lead to "COM" socket and red test leads to the " V/Ω/→~) /Hz " socket.
- 2) Set the selector switch to desired "TEMP" position.
- 3) Press **SELECT** button to choose °C or °F measurement.
- 4) Put the sensor probe into the temperature field under measurement.
- 5) Read the result from the LCD panel.

## 2.9 Frequency measurement

- 1) Connect the black test lead to "COM" socket and red test leads to the " V/Ω/→~) /Hz " socket.
- 2) Set the selector switch to "Hz" position.
- 3) Connect the probes across the source or load under measurement.

## 2.10 Auto Power Off

When the meter has been turned on about 10 minutes without any action from the users, the meter will automatically change to "OFF" mode, and you can press any function button to wake up again. If press and hold **RANGE** button to turn on the meter, the AUTO POWER OFF function will be canceled.

## 2.11 Using Communications

- 1) Connecting the RS232 (USB) cable to the meter and a computer as shown in Figure 1, then turn on the meter.
- 2) Press **RS232** button more than 2 seconds on the panel to start the RS232 communication function.
- 3) If you want to cancel the RS232 function, please press the **RS232** button more than 2 seconds once again.
- 4) About the further information of communication, please refer to the on-line help of Data Logger attached.

**Remarks:** For computer connection, the baud Rate under Set Com Port (Option) should be 9600.

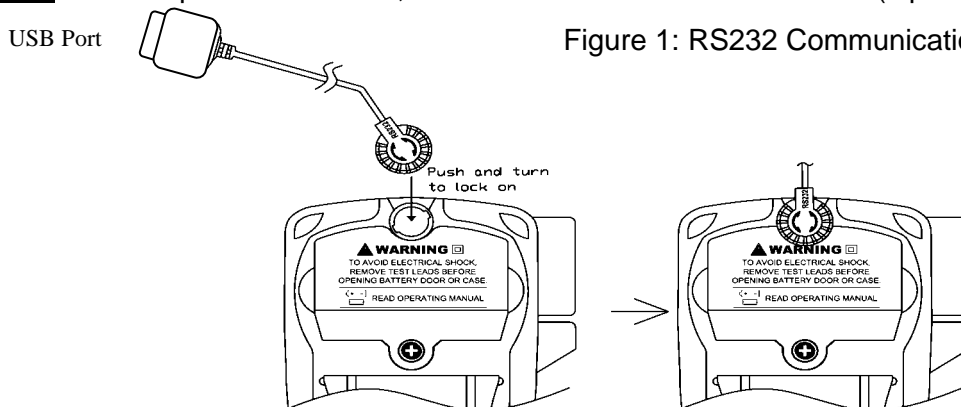


Figure 1: RS232 Communication

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## 3. CARE AND MAINTENANCE

### 3.1. CARING FOR YOUR MULTIMETER

Your Digital MultiMate is an example of superior design and craftsmanship. The following suggestions will help you care for the multimeter so you can enjoy it for years.

- 1) Keep the multimeter dry. If it gets wet, wipe it dry immediately. Liquids can contain minerals that can corrode electronic circuits.
- 2) Use and store the multimeter only in normal temperature environments. Temperature extremes can shorten the life of electronic devices, damage batteries, and distort or melt plastic parts.
- 3) Handle the multimeter gently and carefully. Dropping it can damage the circuit boards and case and can cause the multimeter to work improperly although the holster can provide enough protection.
- 4) Keep the multimeter away from dust and dirt, which can cause premature wear of parts.
- 5) Wipe the multimeter with a damp cloth occasionally to keep it looking new. Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the multimeter.
- 6) Use only fresh batteries of the required size and type. Always remove old or weak batteries. They can leak chemicals that destroy electronic circuits.

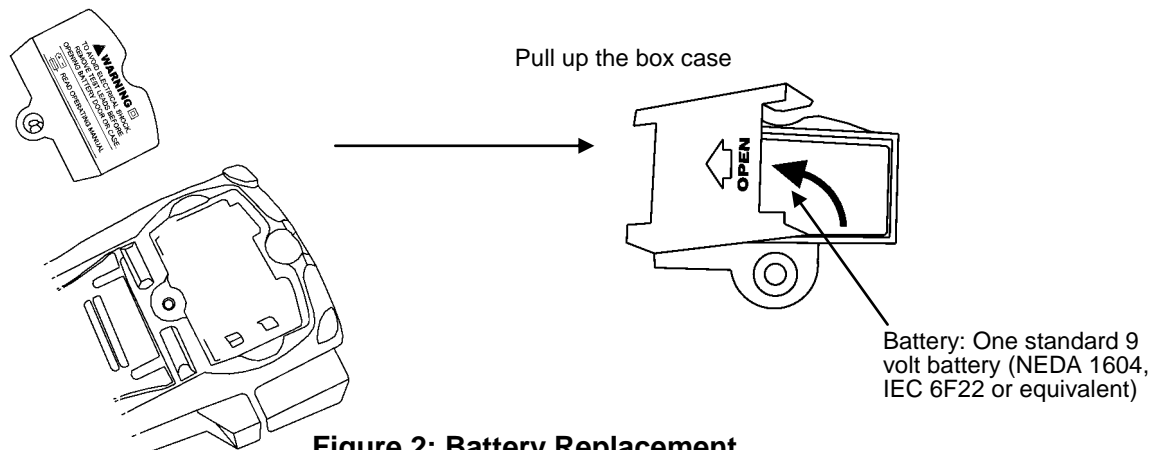
### 3.2. MAINTENANCE

#### 9-Volt battery replacement or fuse replacement

#### WARNING

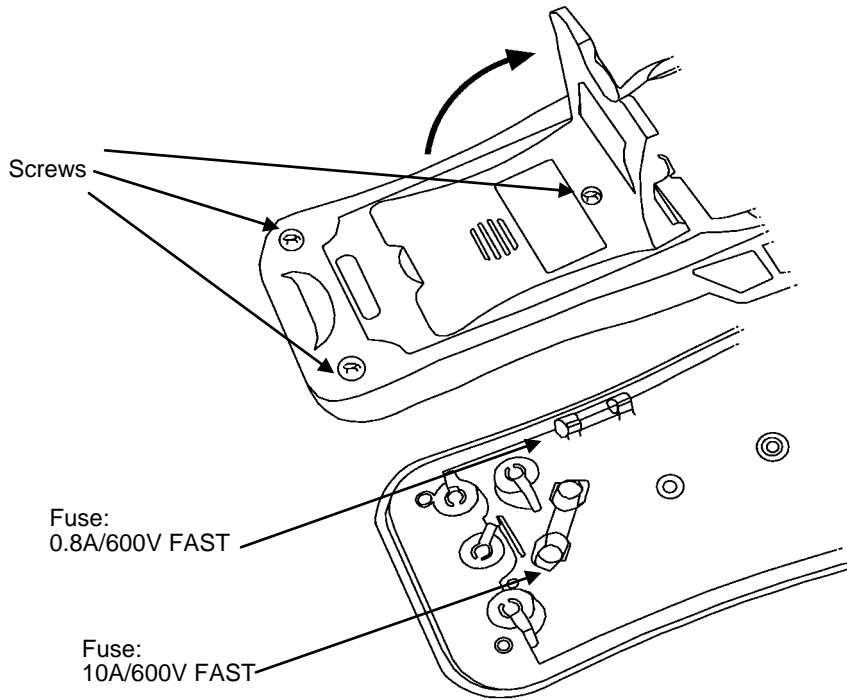
**TO AVOID ELECTRIC SHOCK, REMOVE TEST LEADS BEFORE OPENING CASE AND BATTERY DOOR.**

- 1) Ensure the instrument is not connected to any external circuit. Set the selector switch to "OFF" position and remove the test leads from the terminals.
- 2) Remove the screw on the battery case and lift the battery case. Remove the spent battery and replace it with a battery of the same type.



- 3) Do not dispose the batteries with the household waste. Refer to your local area for the proper disposal of used batteries.
- 4) Remove the screws on the bottom case and lift the case. Replace only with the same type and rating of fuse F2 0.8A/600V FAST or F1 10A/600V FAST.

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## 4. How to do Self-Calibration?

### 4.1. Why need to do self-calibration?

The accuracy of Most DMM is assured under the condition that operating environment is within " $23\pm 5^{\circ}\text{C}$ " and the humidity " $<75\%RH$ ", otherwise the temperature co-efficiency should be taken into consideration. For this DMM, if you perform self-calibration, the accuracy will be kept and the affection of environment changes will be eliminated.

### 4.2. How to self- calibrate a multimeter?

- 1) Rotate the selector switch to " $\Omega/\rightarrow \rightarrow$ " position, make sure the meter is on Ohm mode;
- 2) Press the 'Select' button more than 5 seconds until "CAL" displays on LCD. CAL - means now the meter enters into self-calibration status.
- 3) The self-calibration procedure will be finished within 35 seconds.

**REMARK: Self-calibration can be done only on a multimeter that has the self-calibration function.**