

EM890G


PROFESSIONAL DIGITAL MULTITESTER


Item ref: 600.219UK


User Manual


This digital multimeter has been designed according to IEC-1010 concerning electronic measuring instruments with an over voltage category (CATI) and pollution degree 2.


ELECTRICAL SYMBOLS

 AC (Alternating Current)

 DC (Direct Current)


 Important safety information. Refer to the manual.

 Dangerous voltage may be present.

 Earth ground

 Fuse


 Conforms to European Union directives

 Double insulated



 **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. 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.
- 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 servicing the meter, use only specified replacement parts.
- Use with caution when working above 30V AC RMS, 42V peak, or 60V dc. Such voltages pose a shock hazard.
- 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 the 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.

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.
- Before Function/Range switch to change functions, disconnect test leads from the circuit under test.
- Before attempting to insert transistors for testing, always be sure that the test leads have been disconnected from any measurement circuits.
- Remove test leads from the Meter before opening the Meter case.

MAINTENANCE

- Before opening the case, always disconnect the test leads from all live circuits.
- For continue protection against fire, replace fuse only with the specified voltage and current ratings: F 250mA/250V (Fast Blown) $\varnothing 5 \times 20$
- Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents.

FRONT PANEL DESCRIPTION

1. LCD
2. Power Switch
3. Capacitor Measuring Socket
4. Transistor Testing Socket
5. Function Range Switch
6. Temperature Measuring Socket
7. Input Jacks

GENERAL SPECIFICATIONS

Maximum Display: 1999 counts (3 ½ Digits) with automatic polarity indication

Indication Method: LCD display

Measuring Method: Dual-slope integration A/D converter system

Overrange Indication: Only figure "1" displayed on the LCD

Reading Rate: 2-3 times/second (approximate)

Operating Temperature: 0°C~40°C (32°F~104°F), <75% R.H.

Storage Temperature: -10°C~50°C (14°F~122°F), <75% R.H.

Power Supply: One 9-volt battery (NEDA1604, 6F22)

Low Battery Indication: "⊕ -" displayed on the LCD

Dimensions: 88 x 173 x 40 (mm)

Weight: 340g (including one 9V battery)

TECHNICAL SPECIFICATIONS

Accuracy is specified for a period of one year after calibration and at 18°C~28°C(64°F~82°F) with relative humidity up to 75%.

Accuracy specifications take the form of:

\pm ([% of Reading]+[Number of Least Significant Digits])

DC VOLTAGE

<i>RANGE</i>	<i>RESOLUTION</i>	<i>ACCURACY</i>
200mV	100μV	±(0.8% rdg +5D)
2000mV	1mV	
20V	10mV	
200V	100mV	
600V	1V	±(1.0% rdg +5D)

Input impedance: 10M Ω for all ranges

AC VOLTAGE

<i>RANGE</i>	<i>RESOLUTION</i>	<i>ACCURACY</i>
		600.219
2V	1mV	±1% rdg ±5D
20V	10mV	
200V	100mV	
600V	1V	±1.5% rdg ±5D

Input impedance: 10M Ω for all ranges

Frequency: 40Hz~1000Hz (40Hz~100Hz for 200V and 600V ranges)

Indication: Average (rms of sine wave)

DC CURRENT

RANGE	RESOLUTION	ACCURACY
		600.219
2mA	1 μ A	$\pm 0.8\%$ rdg+5D)
20mA	10 μ A	
200mA	100 μ A	$\pm (1.2\%$ rdg+5D)
10A	10mA	$\pm (2.0\%$ rdg+5D)

Overload protection:

600.219: 250mA/250V fused (Range 10A unfused)

600.524: 2A/250V fused (Range 10A unfused)

Maximum input current: 10A (can not last for more than 10 seconds)

Measuring Voltage Drop: 200mV

AC CURRENT

RANGE	RESOLUTION	ACCURACY
		600.219
200mA	100 μ A	$\pm (1.8\%$ rdg+5D)
10A	10mA	$\pm (3.0\%$ rdg+7D)

Overload protection:

250mA/250V fused (Range 10A unfused)

Maximum input current: 10A (can not last for more than 10 seconds)

Indication: Average (RMS of sine wave)

Max. Voltage Drop: 200mV

RESISTANCE

<i>RANGE</i>	<i>RESOLUTION</i>	<i>ACCURACY</i>
200 Ω	0.1 Ω	$\pm(1.2\% \text{ rdg}+5D)$
2K Ω	1 Ω	$\pm(1.0\% \text{ rdg}+5D)$
20K Ω	10 Ω	
200K Ω	100 Ω	
2M Ω	1K Ω	
20M Ω	10K Ω	$\pm(1.5\% \text{ rdg}+5D)$

Open circuit voltage: less than 700mV.

FREQUENCY

<i>RANGE</i>	<i>RESOLUTION</i>	<i>ACCURACY</i>
20KHz	10Hz	$\pm(1.0\% \text{ rdg}+4D)$

CAPACITANCE

<i>RANGE</i>	<i>RESOLUTION</i>	<i>ACCURACY</i>
2000pF	1pF	$\pm(5.0\% \text{ rdg}+5D)$
20nF	10pF	
200nF	100pF	
2 μ F	1nF	
20 μ F	10nF	

Measuring Voltage: Approximate 40mV RMS.

TRANSISTOR hFE TEST



<i>RANGE</i>	<i>hFE</i>	<i>TEST CURRENT</i>	<i>TEST VOLTAGE</i>
PNP & NPN	$\emptyset \sim 1000$	I _b $\approx 10\mu A$	V _{ce} $\approx 2.0V$

TEMPERATURE

RANGE	Temperature Range	RESOLUTION	ACCURACY
TEMP.	0°C ~ 400°C	1°C	±(1.5% rdg+5°C)
	400°C ~ 1000°C	1°C	±(1.5% rdg+15°C)

Note: Use "K" type thermocouple probe while measuring temperature.

DIODE AND AUDIBLE CONTINUITY TEST

Range	Description	Test Condition
	The approx. forward voltage of the diode under test will be displayed on the LCD.	The forward DC current is approx. 1mA, the reversed DC voltage is approx. 2.8V.
	If the resistance of the circuit under test is less than 30 Ω, the built-in buzzer will sound.	Open circuit voltage approx. 2.8V.

OPERATING INSTRUCTION

DC VOLTAGE MEASUREMENT

- 1) Connect the red test lead to the "V/Ω" jack and the black test lead to the "COM" jack.
- 2) Set the Function / Range switch to the desired "V" range . If the voltage to be measured is not known beforehand, set the range switch to the highest range and then turn down range by range until satisfactory resolution is obtained.
- 3) Connect the test leads to the source or load to be measured.
- 4) Read the voltage value displayed on the LCD along with the polarity of the red test lead.

DC VOLTAGE MEASUREMENT

- 1) Connect the red test lead to the "V/ Ω " jack and the black test lead to the "COM" jack.
- 2) Set the Function / Range switch to the desired " \mathcal{V} " range . If the voltage to be measured is not known beforehand, set the switch to the highest range and then turn down range by range until satisfactory resolution is obtained.
- 3) Connect the test leads to the source or load to be measured.
- 4) Read the voltage value displayed on the.

DC CURRENT MEASUREMENT

- 1) Connect the black test lead to the "COM" jack and the red test lead to the "mA" jack (While the current to be measured is between 200mA and 10A, remove the red test lead to the "10A" jack.)
- 2) Set the Function / Range switch to the desired " \mathcal{A} " range. If the current to be measured is not known beforehand, set the switch to the highest range and then turn down range by range until satisfactory resolution is obtained.
- 3) Open the circuit in which the current is to be measured, and connect the test leads in series with the circuit.
- 4) Read the current value displayed on the LCD along with the polarity of the red test lead.

DC CURRENT MEASUREMENT

- 1) Connect the black test lead to the "COM" jack and the red test lead to the "mA" jack (While the current to be measured is between 200mA and 10A, remove the red test lead to the "10A" jack.)
- 2) Set the Function / Range switch to the desired "A" range. If the current to be measured is not known beforehand, set the switch to the highest range and then turn down range by range until satisfactory resolution is obtained.
- 3) Open the circuit in which the current is to be measured, and connect the test leads in series with the circuit.
- 4) Read the current value displayed on the LCD.

RESISTANCE MEASUREMENT

- 1) Connect the red test lead to the "V/ Ω " jack and the black test lead to the "COM" jack.
- 2) Set the Function / Range switch to the desired Ω range.
- 3) Connect the test leads to the resistor to be measured and read the value displayed on the LCD.


Note:

- For resistance about 1M Ω and above, the meter may take a few seconds to stabilise. This is normal for high resistance readings.


CAPACITANCE MEASUREMENT

- 1) Set the Function / Range switch to the desired Cx range.
- 2) Before inserting the capacitor to be measured into the capacitance measuring socket, be sure that the capacitor has been fully discharged.
- 3) Insert the capacitor to be measured into the capacitance measuring socket.
- 4) Read the capacitance value displayed on the LCD.

DIODE TEST

- 1) Connect the red test lead to "V/Ω" jack and the black test lead to the "COM" jack (The polarity of the red test lead is positive "+")
- 2) Set the Function / Range switch to "" range.
- 3) Connect the red test lead to the anode of the diode to be tested and the black test lead to cathode of the diode. The approximate forward voltage drop will be displayed on the LCD. If the connection is reversed, only figure "1" will be shown.

AUDIBLE CONTINUITY TEST

- 1) Connect the red test lead to "V/Ω" and the black test lead to the "COM" jack.
- 2) Set the Function / Range switch to "" range.
- 3) Connect the test leads to two terminals of the circuit to be tested. If the resistance is less than about 30 Ω, the built-in buzzer will sound.

TRANSISTOR TEST

- 1) Set the Function / Range switch to "hFE" range.
- 2) Determine whether the transistor to be tested is NPN or PNP, and locate the E, B, C leads. Insert the leads into the proper holes of the hFE socket on the front panel.
- 3) Read the approximate hFE value at the test condition of base current 10μA and Vce 2.8V.

FREQUENCY MEASUREMENT (For 600.219 only)

- 1) Set the Function / Range switch to the "KHz" range.
- 2) Connect the black test lead to the "COM" jack and the red test lead to the "V/Ω" jack.
- 3) Connect the test leads to the source or load to be measured.
- 4) Read the frequency value displayed on the LCD.


TEMPERATURE MEASUREMENT

- 1) Insert the K type probe to the temperature jack.
- 2) Set the Function / Range switch to the "°C" range.
- 3) Connect the K type probe to the object to be measured.
- 4) Read Temperature value in displayed on the LCD.

AUTO POWER-OFF

The function of auto power-off extends the life of the battery by turning the meter off if the range switch has not been operated for about 15 minutes. To turn the meter on again, just rotate the range switch or press the power switch.

BATTERY AND FUSE REPLACEMENT

If "" appears on the LCD, it indicates that the battery should be replaced. To replace battery, open the case, and replace the exhausted battery with the ratings specified: 9V, NEDA 1604 or 6F22, and then close the case.

Fuse rarely needs replacement and is blown as a result of the operator's error. To replace the fuse, open the case, and replace the blown fuse with the ratings specified: F 250mA/250V and then close the case.

ACCESSORIES

- Users Manual: 1 copy
- Test leads: 1 pair
- 9V Battery (NEDA 1604 or 6F22): 1 piece
- K type thermocouple: 1 piece