

OPERATOR'S INSTRUCTION MANUAL

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SAFETY INFORMATION

This multimeter has been designed according to IEC-1010 concerning electronic measuring instruments with an overvoltage category (CAT II) and pollution 2.

Follow all safety and operating instructions to ensure that the meter is used safely and is kept in good operating condition. Full compliance with safety standards can be guaranteed only with test leads supplied. If necessary, they must be replaced with the type specified in this manual.

SAFETY SYMBOLS



Important safety information, refer to the operating manual.



Dangerous voltage may be present.



Earth ground.



Double insulation (Protection class II).



Fuse must be replaced with rating specified in the manual.

MAINTENANCE

- Before opening the case, always disconnect test leads from all energized circuits.
- For continue protection against fire; replace fuse only with the specified voltage and current ratings:
F 200mA/250V(Quick Acting)
- Never use the meter unless the back cover is in place and fastened completely.
- Do not use abrasives or solvents on the meter. To clean it using a damp cloth and mild detergent only.

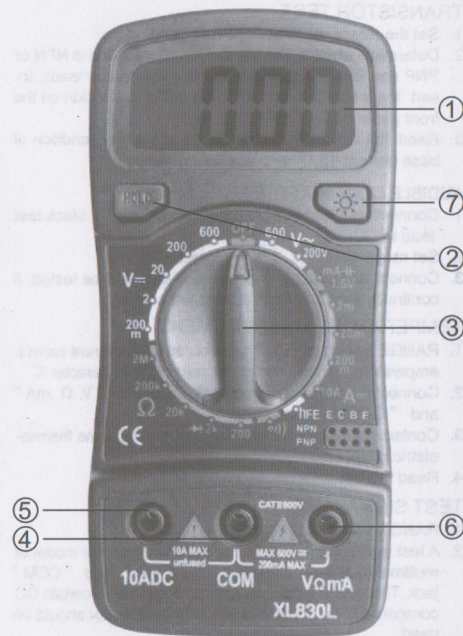
DURING USE

- Never exceed the protection limit values indicated in specifications for each range of measurement.
- When the meter is linked to measurement circuit, do not touch unused terminals.
- Never use the meter to measure voltages that might exceed 600V above earth ground in category II installations.
- When the value scale to be measured is unknown beforehand, set the range selector at the highest position.
- Before rotating the range selector to change functions, disconnect test leads from the circuit under test.
- When carrying out measurements on TV or switching power circuits always remember that there may be high amplitude voltages pulses at test points, which can damage the meter.
- Always be careful when working with voltages above 60V dc or 30V ac rms. Keep fingers behind the probe barriers while measuring.
- Before attempting to insert transistors for testing, always be sure that test leads have been disconnected from any measurement circuits.
- Components should not be connected to the hFE socket when making voltage measurements with test leads. Never perform resistance measurements on live circuits.

GENERAL DESCRIPTION

The meter is a handheld 3 1/2 digital multimeter for measuring Dc and AC voltage, DC current, Resistance, Diode, Transistor and Continuity Test with battery operated.

FRONT PANEL



FRONT PANEL DESCRIPTION

- Display
3 1/2 digit, 7 segment, 15mm high LCD.
- Hold button
When this button is pushed, the display will keep the last reading and "HOLD" symbol will appear on the LCD until pushing it again.
- Rotary switch
This switch is used to select functions and desired ranges as well as to turn on/off the meter.
- "COM" jack
Plug in connector for black (negative) test lead.
- "10A" jack
Plug in connector for red test lead for 10A measurement.
- "VΩmA" jack
Plug in connector for red (positive) test lead for voltage, resistance and current (except 10A) measurements.
- Backlight

SPECIFICATIONS

Accuracy is specified for a period of one year after calibration and at 18 to 28 °C (64 °F to 82 °F) with relative humidity to 80%.

GENERAL

Maximum voltage between terminals and earth ground	: CAT II 600V
Fuse protection	: F 200mA/250V
Power	: 9v battery, NEDA 1604 or 6F22
Display	: LCD, 1999 counts, updates 2 - 3/sec.
Measuring method	: Dual-slope integration A/D converter
Overrange indication	: Only figure "1" on the display
Polarity indication	: "-" displayed for negative polarity
Operating Environment	: 0 to 40 °C
Storage temperature	: -10 °C to 50 °C
Low battery indication	: "BAT" appears on the display
Size	: 138mm x 69mm x 31mm

Weight : Approx. 170g

DC VOLTAGE

Range	Resolution	Accuracy
200mV	100 μ V	$\pm 0.5\%$ of rdg ± 2 digits
2V	1mV	$\pm 0.5\%$ of rdg ± 2 digits
20V	10mV	$\pm 0.5\%$ of rdg ± 2 digits
200V	100mV	$\pm 0.5\%$ of rdg ± 2 digits
600V	1V	$\pm 0.8\%$ of rdg ± 2 digits

Overload Protection: 250V rms. For 200mV range and 600V dc or rms. ac for other ranges.

DC CURRENT

Range	Resolution	Accuracy
200 μ A	0.1 μ A	$\pm 1\%$ of rdg ± 2 digits
2mA	1 μ A	$\pm 1\%$ of rdg ± 2 digits
20mA	10 μ A	$\pm 1\%$ of rdg ± 2 digits
200mA	100 μ A	$\pm 1.5\%$ of rdg ± 2 digits
10A	10mA	$\pm 3\%$ of rdg ± 2 digits



Overload Protection: F 200mA/250V fuse. (10A range unfused)

AC VOLTAGE

Range	Resolution	Accuracy
200V	100mV	$\pm 1.2\%$ of rdg ± 10 digits
600V	1V	$\pm 1.2\%$ of rdg ± 10 digits

Overload Protection: 600V dc or rms. ac for all ranges.
Frequency range: 40Hz to 400Hz. Response: Average responding, calibrated in rms. of a sine wave.

DIODE & CONTINUITY

Range	Description
	If continuity exists (about less than 1.5K Ω), built-in buzzer will sound.
	Show the approx. forward voltage drop of the diode.

Overload Protection: 250V dc or rms. ac.

RESISTANCE

Range	Resolution	Accuracy
200 Ω	0.1 Ω	$\pm 0.8\%$ of rdg ± 3 digits
2k Ω	1 Ω	$\pm 0.8\%$ of rdg ± 2 digits
20k Ω	10 Ω	$\pm 0.8\%$ of rdg ± 2 digits
200k Ω	100 Ω	$\pm 0.8\%$ of rdg ± 2 digits
2M Ω	1k Ω	$\pm 1.0\%$ of rdg ± 2 digits

Maximum Open Circuit Voltage: 3.2V

Overload protection: 250V dc or rms. ac for all ranges.

TRANSISTOR hFE TEST (0-1000)

Range	Test Range	Test Current	Test Voltage
NPN & PNP	0-1000	1b=10 μ A	Vce=3V

TEMPERATURE (K TYPE PROBE)

Range	Resolution	Accuracy
-20 $^{\circ}$ C to 1370 $^{\circ}$ C	1 $^{\circ}$ C	$\pm 3^{\circ}$ $\pm 2D$ (up to 150 $^{\circ}$ C) $\pm 3^{\circ}$ % of rdg(over 150 $^{\circ}$ C)

OVERLOAD PROTECTION: 220Vrms AC.

OPERATING INSTRUCTIONS

DC VOLTAGE MEASUREMENT

1. Connect the red test lead to the "V. Ω .mA" jack and the black lead to the "COM" jack
2. Set rotary switch at desired DCV position. If the voltage to be measured is not known beforehand, set range switch at the highest range position and then reduce it until satisfactory resolution is obtained.
3. Connect test leads across the source or load being measured.
4. Read voltage value on the LCD display along with the polarity of the red lead connection.

DC CURRENT MEASUREMENT

1. Connect the red test lead to the "V. Ω .mA" jack and the

- black test lead to "COM" jack. (For measurements between 200mA and 10A, remove red lead to "10A" jack.)
2. set the rotary switch at desired DCA position.
 3. Open the circuit in which the current is to be measured, and connect test leads in series with the circuit.
 4. Read current value on LCD display along with the polarity of red lead connection.

AC VOLTAGE MEASUREMENT

1. Connect the red test lead to the "V. Ω .mA" jack and the black test lead to "COM" jack.
2. Set the rotary switch at desired ACV position.
3. Connect test leads across the source or load being measured.
4. Read voltage value on the LCD display.

RESISTANCE MEASUREMENT

1. Connect the red test lead to the "V. Ω .mA" jack and the black test lead to the "COM" jack. (The polarity of red lead is positive "+".)
2. Set the rotar switch at desired " Ω " range position.
3. Connect test leads across the resistor to be measured and read LCD display.
4. If the resistance being measured is connected to a circuit, turn off power and discharge all capacitors before applying test probes.

DIODE TEST

1. Connect the red test lead to the "V. Ω .mA" jack and the black test lead to "COM" jack. (The polarity of red lead is positive "+".)
2. Set the rotary switch at " \rightarrow " position.
3. Connect the red test lead to the anode of the diode to be tested and the black test lead to the cathode of the diode. The approx. forward voltage drop of the diode will be displayed.

If the connection is reversed, only figure "1" will be shown.

TRANSISTOR TEST

1. Set the rotary switch at "hFE" position.
2. Determine whether the transistor under testing is NPN or PNP and locate the emitter, base and collector leads. Insert the leads into proper holes of the hfe socket on the front panel.
3. Read the approximate hFE value at the test condition of base current 10 μ A and Vce 3V.

AUDIBLE CONTINUITY TEST

1. Connect red test lead to the "V. Ω .mA", black test lead to "COM".
2. Set range switch to ")))" position.
3. Connect test leads to two points of circuit to be tested. If continuity exists, built-in buzzer will sound.

TEMPERATURE MEASUREMENT

1. RANGE switch to TEMP position and the current room temperature appears on the display with the character $^{\circ}$.
2. Connect the k type thermoelectric couple to "V. Ω .mA" and "COM" jacks.
3. Contact the object under measurement with the thermoelectric couple carefully.
4. Read the temperature $^{\circ}$ on the display.

TEST SIGNAL USE

1. RANGE switch to \square position.
2. A test signal(50Hz or 1000Hz depending on the model of multimeter) appears between "V. Ω .mA" and "COM" jack. The output voltage is approx. 5Vpp with a certain DC component, so additional insulating capacitor should be used.

BATTERY & FUSE REPLACEMENT

If "E" APPEARS ON DISPLAY, IT INDICATES THAT THE BATTERY SHOULD BE REPLACED.

Fuse rarely need replacement and blow almost always as a result of operator's error.

To replace battery & fuse (200mA/250V) remove the 2 screws in the bottom of the case. Simply remove the old, and replace with a new one.

Be careful to observe battery polarity.



WARNING

Before attempting to open the case, always be sure that test leads have been disconnected from measurement circuits.

Close case and tighten screws completely before using the meter to avoid electrical shock hazard.

ACCESSORIES

- 1 \bar{n} Operator's instruction manual
- 1 \bar{n} Set of test leads
- 1 \bar{n} Gift box
- 1 \bar{n} 9 volt battery. NEDA 1604 6F22 type
- 1 \bar{n} Holster(option)
- 1 \bar{n} K type thermoelectric couple(Optional)