

# **OPERATOR'S INSTRUCTION MANUAL**

## **MINI DIGITAL MULTIMETER**

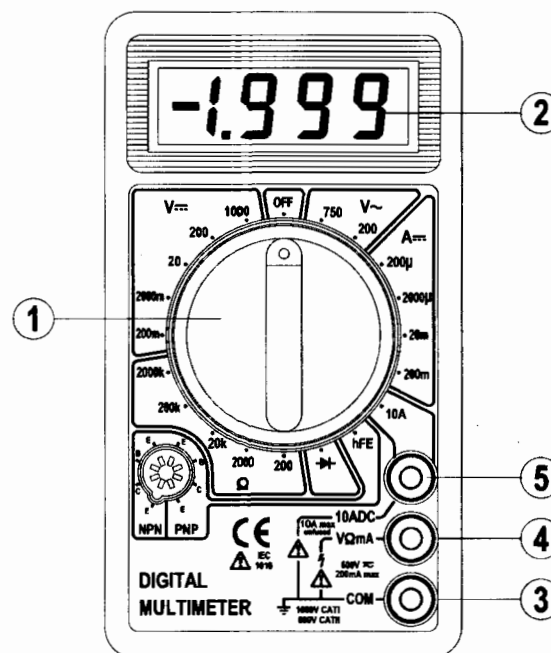


### **WARNING**

READ AND UNDERSTAND THIS MANUAL  
BEFORE USING THE INSTRUMENT.

READ AND UNDERSTAND THE  
" SAFETY INFORMATION "

### **MULTIMETER LAYOUT**



### SAFETY INFORMATION

The meter has been designed according to IEC1010 concerning electronic measuring instruments with an overvoltage category (1000V CATI) pollution 1 and (600V CAT II) pollution 2.

**CAT I** : for measurement performed on circuits not directly connected to MAINS.

**CAT II** : for measurement performed on circuits not directly connected to the low voltage installation.

All safety and operating instructions to ensure the meter is used safely and is kept in good 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.

### DURING USE

- Never exceed the protection limit indicated in the specifications for each range of measurement.
- When the meter is linked to measurement circuit, be careful not to touch unused terminals.
- Never use the meter to measure voltages that might exceed 1000V category I, pollution 1. Never use the meter to measure voltages that might exceed 600V in category II pollution 2.
- 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.
- Do not perform resistance measurements on live circuits.

### SAFETY SYMBOLS



Important safety information, refer to the instruction manual.



Dangerous voltage may be present.



Earth ground.



Double insulation



Fuse must be replaced with ratings specified in the manual.

### MAINTENANCE

- Before opening the case, always disconnect test leads from all energized circuits.
- For continuous protection against fire, replace fuse only with ratings: F 250mA/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 only a damp cloth and mild detergent.

### FRONT PANEL DESCRIPTION

#### 1 Rotary Switch

This switch is used to select the function and desired ranges as well as to turn on/off the meter.

#### 2 Display

3 1/2 digit, 7 segment, 0.5" high LCD.

#### 3 "COM" Jack

Plug in connection for black (negative) test lead.

#### 4 "VΩmA" Jack

Plug in connection for red (positive) test lead for voltage, resistance and current (except 10A) measurements.

#### 5 "10A" Jack

Plug in connection for red (positive) test lead for 10A measurement.

### SPECIFICATIONS

Accuracy is guaranteed for 1 year, 23°C ± 5°C, less than 75% relative humidity.

#### AC VOLTAGE

Range	Resolution	Accuracy
200V	100mV	±1.2 % of rdg ± 10 digits
750V	1V	±1.2 % of rdg ± 10 digits

Overload protection: 1000V dc or 750V rms ac for all ranges.  
Frequency range: 45Hz to 450Hz  
Response: Average responding, calibrated in rms of a sine wave.

#### DC VOLTAGE

Range	Resolution	Accuracy
200mV	0.1mV	±0.5% of rdg ± 2 digits
2000mV	1mV	±0.5% of rdg ± 2 digits
20V	10mV	±0.5% of rdg ± 2 digits
200V	100mV	±0.5% of rdg ± 2 digits
1000V	1V	±0.8% of rdg ± 2 digits

Overload protection: 250V rms. ac for 200mV range and 1000 dc or 750Vrms ac for other ranges.

#### DC CURRENT

Range	Resolution	Accuracy
200μA	0.1μA	±1.0% of rdg ± 2 digits
2000μA	1μA	±1.0% of rdg ± 2 digits
20mA	0.01mA	±1.0% of rdg ± 2 digits
200mA	0.1mA	±1.5% of rdg ± 2 digits
10A	10mA	±3.0% of rdg ± 2 digits

Overload protection: F250mA 250V fuse (10A range unfused).

#### RESISTANCE

Range	Resolution	Accuracy
200Ω	0.1Ω	±0.8% of rdg ± 3 digits
2000Ω	1Ω	±0.8% of rdg ± 2 digits
20kΩ	10Ω	±0.8% of rdg ± 2 digits
200kΩ	100Ω	±0.8% of rdg ± 2 digits
2000kΩ	1kΩ	±1.0% of rdg ± 2 digits

Maximum open circuit voltage: 2.8V  
 Overload protection: 15 seconds maximum 250V rms. ac on all ranges.

#### DIODE TEST

Range	Description
→	Show the approx. forward voltage drop of the diode.

Overload protection: 250V rms. ac.

#### GENERAL

Maximum voltage between terminals and earth ground	: CAT I 1000V, CAT II 600V
Fuse protection	: F 250mA/250V, 10A range unfuse.
Power supply	: 1 × 9V $\text{---}$ , 6F22 or NEDA 1604
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 (32°F to 104°F)
Storage temperature	: -10°C to 50°C (10°F to 122°F).
Low battery indication	: "BAT" appear on the display
Size	: 126×70×25mm
Weight	: Approx. 170g

#### OPERATING INSTRUCTIONS

##### AC VOLTAGE MEASUREMENT

1. Connect the red test lead to "V $\Omega$ mA" jack and the black lead to the "COM" jack.
2. Set the rotary switch at desired V $\sim$  position.
3. Connect test leads across the source or load being measured and read voltage value on the LCD display.

##### DC VOLTAGE MEASUREMENT

1. Connect red test lead to "V $\Omega$ mA" jack and the black test lead to the "COM" jack.
2. Set rotary switch at desired V  $\text{---}$  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 lead across the source or load being measured. 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 $\Omega$ mA" jack and the black lead to "COM" jack. (For measuring current between 200mA and 10A, remove red lead to "10A" jack.)
2. Set the rotary switch at desired A  $\text{---}$  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 the LCD display along with the polarity of red lead connection.

##### RESISTANCE MEASUREMENT

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

##### TRANSISTOR TEST

1. Set the rotary switch at "hFE" position.
2. Determine whether the transistor under testing is NPN or PNP type and locate the emitter, base and collector leads. Insert the leads into proper holes of the hFE socket on the front panel.
3. The meter will show the approximate hFE value at the condition of base current 10 $\mu$ A and Vce 3V.

##### NOTE:

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.

#### DIODE TEST

1. Connect the red test lead to "V $\Omega$ mA" jack and the black lead to "COM" jack. (The polarity of red lead is positive "+").
2. Set the rotary switch at → position.
3. Connect the red lead to the anode of the diode to be tested and the black lead to the cathode of the diode.
4. The approx. forward voltage drop of the diode will be display in mV. If the connection is reversed, only figure "1" will be shown.

#### BATTERY & FUSE REPLACEMENT

If the sign "BAT" appears on the LCD display, it indicates that the battery should be replaced. Loosen screws on the back cover and open the case. Replace the exhausted with a new one of the same type.

Fuse really need replacement and blow almost always as a result of operator's error. Open the case and replace the blown fuse with the ratings specified: F250mA/250V.

#### 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

- Operator's instruction manual
- Set of test leads
- Battery: 1 × 9V  $\text{---}$  6F22 or NEDA 1604 type

#### CAUTION:

Using this appliance in an environment with a strong radiated radio-frequency electromagnetic field (approximately 3V/m), may influence its measuring accuracy. The measuring result can be strongly deviating from the actual value.