TENMA®

Model 72-7735

Operating Manual

Modern Digital Multimeter

Tenma Test Equipment
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Table of Contents

Overview

This Operating Manual covers information on safety and cautions. Please read the relevant information carefully and observe all the **Warnings** and **Notes** strictly.

⚠ Warning
To avoid electric shock or personal injury, read the "Safety Information" and "Rules for Safe Operation" carefully before using the Meter.

Digital Multimeter **Model 72-7735** (hereafter referred to as "the Meter") has autorange and manual range options with maximum reading 3999. The enclosure structure design adopted advanced "co-injection" technique in order to provide sufficient insulation.

In addition to the conventional measuring functions, it is equipped with a RS232C standard serial port for easy connection with computer to realize macro recording and monitoring and capture of transient dynamic data, displaying change of waveform during the measurement, providing data and evidence to engineering technicians for scientific research. This is also a highly applied digital multimeter of good performance with full overload protection.

Unpacking Inspection

Open the package case and take out the Meter. Check the following items carefully for missing or damaged parts:

Item	Description	Qty
1	Operating Manual	1 piece
2	Test Lead	1 pair
3	9V Battery (NEDA1604, 6F22 or 006P) (installed)	1 piece
4	RS232C Interface Cable	1 piece
5	CD-ROM (Installation Guide & Computer Interface Software)	1 piece

In the event you find items missing or damaged, please contact your dealer immediately.

Safety Information

This Meter complies with the standards IEC61010: in pollution degree 2, overvoltage category (CAT. III 1000V, CAT. IV 600V) and double insulation.

CAT. III: Distribution level, fixed installation, with smaller transient overvoltages than CAT. IV
CAT IV:Primary supply level, overhead lines, cable systems etc.

Use the Meter only as specified in this operating manual, otherwise the protection provided by the Meter may be impaired.

In this manual, a **Warning** identifies conditions and actions that pose hazards to the user, or may damage the Meter or the equipment under test.

A **Note** identifies the information that user should pay attention to.

International electrical symbols used on the Meter and in this Operating Manual are explained on page 8.

Rules For Safe Operation (1)

⚠ **Warning**

To avoid possible electric shock or personal injury, and to avoid possible damage to the Meter or to the equipment under test, adhere to the following rules:

- **Before using the Meter inspect the case. Do not use the Meter if it is damaged or the case (or part of the case) is removed. Look for cracks or missing plastic. Pay attention to the insulation around the connectors.**
- **Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads with identical model number or electrical specifications before using the Meter.**
- **Do not apply more than the rated voltage, as marked on the Meter, between the terminals or between any terminal and ground.**
- **The rotary switch should be placed in the correct position and no changeover of range shall be made during measurement, to prevent damage of the Meter.**
- **When working at an effective voltage over 60V DC or 30V rms AC for there is danger of electric shock.**
- **Use the proper terminals, function, and range for your measurements.**
- **Do not use or store the Meter in an environment of high temperature, humidity, explosive, flammable and strong magnetic field. The performance of the Meter may deteriorate after dampened.**
- **When using the test leads, keep your fingers behind the finger guards.**
- **Disconnect circuit power and discharge all high-voltage capacitors before testing continuity, diodes, resistance, capacitance or current.**

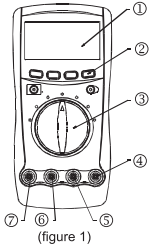
Rules For Safe Operation (2)

- Before measuring current, check the Meter's fuses and turn off power to the circuit before connecting the Meter .
- Replace the battery as soon as the battery indicator appears. With a low battery, the Meter might produce false readings that can lead to electric shock and personal injury.
- Remove test leads and RS232C interface cable from the Meter and turn the Meter power off before opening the Meter case.
- When servicing the Meter, use only the same model number or identical electrical specifications replacement parts.
- The internal circuit of the Meter shall not be altered at will to avoid damage of the Meter and any accident.
- Soft cloth and mild detergent should be used to clean the surface of the Meter when servicing. No abrasive and solvent should be used to prevent the surface of the Meter from corrosion, damage and accident.
- The Meter is suitable only for indoor use.
- If exposed to an environment with high (+/-4kV) electrostatic discharge, the Meter may not operate as normal ,and may require resetting .
- Turn the Meter off when it is not in use and take out the battery when not using for a long time.
- Periodically check the battery as it may leak after some time.If leakage is apparent,the battery should be immediately replaced to prevent damage.

International Electrical Symbols

	AC (Alternating Current).
	DC (Direct Current).
	AC or DC.
	Grounding.
	Double Insulated.
	Low Battery.
	Continuity Test.
	Diode.
	Capacitance Test.
	Fuse.
	Warning. Refer to the Operating Manual.
	Conforms to Standards of European Union.

The Meter Structure (see figure 1)



(figure 1)

① LCD Display
② Functional Buttons
③ Rotary Switch
④ **HzVΩ** Input Terminal:
Input for voltage, frequency/duty cycle, resistance, diode, continuity and capacitance measurements.
⑤ **COM** Input Terminal:
Return terminal for all measurements.
⑥ **μAmA** Input Terminal:
Input for 0.1μA to 400.0mA current measurements.
⑦ **10A** Input Terminal:
Input for 0.001A to 10.00A current measurements.

Rotary Switch

The table below provides information about rotary switch positions.

Rotary Switch Position	Function
Hz≂ V	AC voltage measurement range from 400.0mV to 1000V or DC voltage measurement range from 4.000V to 750.0V.
•))) →|← Ω	•))) Continuity test. →|← Diode test. Ω Resistance measurement range from 400.0Ω to 40.00MΩ.
⊣⊢	Capacitance test range from 40.00nF to 100.0μF.
Hz%	Frequency measurement range from 10.00Hz to 10.00MHz. Duty Cycle measurement.
μA≂ Hz	AC or DC current measurement range from 400.0 μA to 4000μA
mA≂ Hz	AC or DC current measurement range from 40.00mA to 400.0mA.
Hz≂ A	AC or DC current measurement range from 4.000A to 10.00A.

Functional Buttons (1)

The table below provides information about functional button operation.

Button	Measuring Function	Operation Performed
POWER	Any rotary switch position	Turn power on and off.
◯ **(BLUE)**	**Hz⎓ V**	Switches between AC and DC voltage; the Meter beeps. DC is default.
	•))→⊢ **Ω**	Switches between continuity and diode and resistance measurements; the Meter beeps. Resistance is default.
	μA⎓ Hz	Switches between AC and DC current range from 400.0 μA to 4000 μA; the Meter beeps. DC is default.
	mA⎓ Hz	Switches between AC and DC current range from 40.00mA to 400.0mA; the Meter beeps. DC is default.
	Hz⎓ A	Switches between AC and DC current range from 4.000A to 10.00A; the Meter beeps. DC is default.

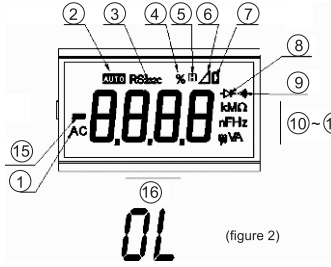
Functional Buttons (2)

RANGE	Any rotary switch position except at **Hz%** and ⊣⊢ mode.	1. Press **RANGE** to enter the manual ranging mode; the Meter beeps. Manually selecting a range causes the Meter to exit the Hold and REL modes. 2. Press **RANGE** to step through the ranges available for the selected function; the Meter beeps. 3. Press and hold **RANGE** for around 2 seconds to return to autoranging; the Meter beeps.
Hz %	**Hz%**	1. Press **Hz %** to start the frequency counter; the Meter beeps. 2. Press **Hz %** again to enter duty cycle mode; the Meter beeps. 3. Press **Hz %** again to return to the frequency counter mode; the Meter beeps.

Functional Buttons (3)

Hz %	**Hz≂ V, µA≂ Hz, mA≂ Hz** or **Hz≂ A**	1. Press to start the frequency counter; the Meter beeps. 2. Press again to enter duty cycle mode; the Meter beeps. 3. Press the third time to return to voltage or current measurement mode; the Meter beeps.
REL Δ	Any rotary switch position except **Hz%**	Press **REL** Δ to enter and exit the REL mode in any measuring mode except in frequency/duty cycle mode ; the Meter beeps.
HOLD H	Any rotary switch position	Press **HOLD H** to enter and exit the Hold mode in any mode, the Meter beeps.

Display Symbols (1) (see figure 2)



(figure 2)

Number	Symbol	Meaning
①	**AC**	Indicator for AC voltage or current. The displayed value is the mean value.
②	**AUTO**	The Meter is in the auto range mode in which the Meter automatically selects the range with the best resolution.
③	**RS232C**	Data output. It is always on the LCD, but data output is only in progress when the Meter is connected to the computer via the included RS232C Interface Cable.
④	%	Percent: Used for duty cycle measurements.
⑤	**H**	Data hold is active.

Display Symbols (2)

⑥	Δ	The REL mode on，displays the present value minus the stored value.
⑦		The battery is low. ⚠**Warning: To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator appears.**
⑧		Diode Test.
⑨		The continuity buzzer is on.
⑩ ~ ⑭	Ω ,kΩ, MΩ	Ω: Ohm. The unit of resistance. kΩ: kilohm. 1 x 10^3 or 1000 ohms. MΩ: Megaohm. 1 x 10^6 or 1,000,000 ohms.
	F, μF, nF	F: Farad. The unit of capacitance. μF: Microfarad. 1 x 10^{-6} or 0.000001 farads. nF: Nanofarad. 1 x 10^{-9} or 0.000000001 farads.
	Hz, kHz, MHz	Hz: Hertz. The unit of frequency in cycles/second. kHz: Kilohertz. 1 x 10^3 or 1,000 hertz. MHz: Megahertz. 1 x 10^6 or 1,000,000 hertz.

Display Symbols (3)

	V, mV	V: Volts. The unit of voltage. mV: Millivolt. 1 x 10^{-3} or 0.001 volts.
	A, mA, µA	A: Amperes (amps). The unit of current. mA: Milliamp. 1 x 10^{-3} or 0.001 amperes. µA: Microamp. 1x 10^{-6} or 0.000001 amperes.
⑮	**▬**	Indicates negative reading.
⑯	**OL**	The input value is too large for the selected range.

Measurement Ranges (1)

A measurement range determines the highest value the Meter can measure. Most Meter functions have more than one range. See "Accuracy Specifications."

A. Selecting a Measurement Range

Being in the right measurement range is important:

- If the range is too low for the input, the Meter displays OL to indicate an overload.
- If the range is too high, the Meter will not display the most accurate measurement.

B. Manual Ranging and Autoranging

The Meter has both manual range and autorange options:

- In the autorange mode, the Meter selects the best range for the input detected.
  This allows you to switch test points without having to reset the range.
- In the manual range mode, you select the range.
  This allows you to override autorange and lock the Meter in a specific range.

The Meter defaults to the autorange mode in measurement functions that have more than one range. When the Meter is in the autorange mode, AUTO is displayed.

Measurement Ranges (2)

To enter and exit the manual range mode:

1. Press **RANGE**.
   The Meter enters the manual range mode and AUTO turns off.
   Pressing the **RANGE** button increments the meter to the next range. When the highest range is reached, the Meter wraps to the lowest range.
2. To exit the manual range mode, press and hold **RANGE** for over 2 seconds.
   The Meter returns to the autorange mode and AUTO is displayed.

Note

- If you manually change the measurement range after entering the REL or Hold modes, the Meter exits these modes.
- Under frequency/duty cycle and capacitance measurement, only autorange mode is available.

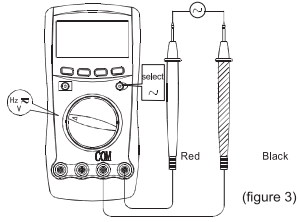
Measurement Operation (1)

A. AC & DC Voltage Measurement

⚠ Warning

To avoid harm to you or damage to the Meter from electric shock, please do not attempt to measure voltages higher than 1000V / 750V rms although readings may be obtained.

AC Voltage Measurement (see figure 3)



(figure 3)

The AC voltage ranges are: 4.000V, 40.00V, 400.0V and 750.0V. To measure AC Voltage, connect the Meter as follows:

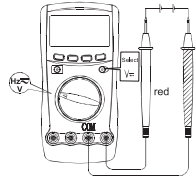
1. Insert the red test lead into the **HzVΩ** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to **Hz⏦V** and press **BLUE** button to select AC measurement mode.
3. Connect the test leads across with the object being measured.
   The measured value shows on the display, which is effective value of sine wave (mean value response).

Measurement Operation (2)

Note

- In each range, the Meter has an input impedance of 10MΩ. This loading effect can cause measurement errors in high impedance circuits. If the circuit impedance is less than or equal to 10kΩ, the error is negligible (0.1% or less).
- When AC voltage measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

DC Voltage Measurement (see figure 4)



(figure 4)

The DC Voltage ranges are: 400.0mV, 4.000V, 40.00V, 400.0V and 1000V. To measure DC voltage, connect the Meter as follows:

1. Insert the red test lead into the **HzVΩ** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to **Hz≂V**; DC measurement is default or press **BLUE** button to select DC measurement mode.
3. Connect the test leads across with the object being measured.
   The measured value shows on the display.

Measurement Operation (3)

Note

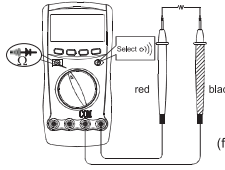
- In each range, the Meter has an input impedance of 10MΩ. This loading effect can cause measurement errors in high impedance circuits. If the circuit impedance is less than or equal to 10k Ω, the error is negligible (0.1% or less).
- When DC voltage measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

B. Measuring Continuity, Diodes & Resistance

⚠ Warning

To avoid damage to the Meter or to the devices under test, disconnect circuit power and discharge all the high-voltage capacitors before measuring continuity, diodes & resistance.

Testing for Continuity (see figure 5)



(figure 5)

To test for continuity, connect the Meter as below:

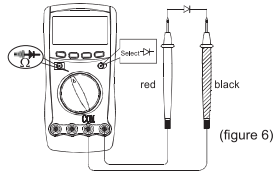
1. Insert the red test lead into the **HzV**Ωterminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to •))) Ω and press **BLUE** button to select •))) measurement mode.
3. The buzzer sounds if the resistance of a circuit under test is less than 100Ω .

Measurement Operation (4)

Note

- The LCD displays **OL** indicating the circuit being tested is open.
- When continuity testing has been completed, disconnect the connection between the test leads and the circuit under test.

Testing Diodes (see figure 6)



(figure 6)

Use the diode test to check diodes, transistors, and other semiconductor devices. The diode test sends a current through the semiconductor junction, and then measures the voltage drop across the junction. A good silicon junction drops between 0.5V and 0.8V.

To test a diode out of a circuit, connect the Meter as follows:

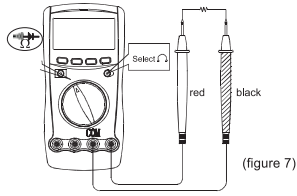
1. Insert the red test lead into the **HzVΩ** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to ΩHzV and press **BLUE** button to select ⊣ measurement mode.
3. For forward voltage drop readings on any semiconductor component, place the red test lead on the component's anode and place the black test lead on the component's cathode.
   The measured value shows on the display.

Measurement Operation (5)

Note

- In a circuit, a good diode should still produce a forward voltage drop reading of 0.5V to 0.8V; however, the reverse voltage drop reading can vary depending on the resistance of other pathways between the probe tips.
- Connect the test leads to the proper terminals as said above to avoid error display.
- The LCD will display **OL** indicating open-circuit for wrong connection.
- The unit of diode is Volt (V), displaying the positive-connection voltage-drop value.
- When diode testing has been completed, disconnect the connection between the test leads and the circuit under test.

Resistance Measurement (see figure 7)



(figure 7)

The resistance ranges are: 400.0Ω, 4.000kΩ, 40.00kΩ, 400.0kΩ , 4.000MΩ and 40.00MΩ . To measure resistance, connect the Meter as follows:

1. Insert the red test lead into the **HzVΩ** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to •))) ⊣ Ω, resistance measurement (Ω) is defaults or press **BLUE** button to select Ω measurement mode.

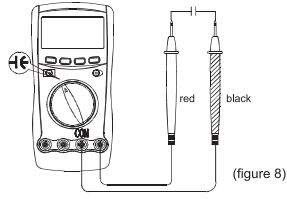
Measurement Operation (6)

3. Connect the test leads across with the object being measured.
   The measured value shows on the display.

Note

- The test leads can add 0.1Ωto 0.2Ωof error to resistance measurement. To obtain precision readings in low-resistance measurement, that is the range of 400.0Ω, short-circuit the input terminals beforehand, using the relative value function button **REL** Δ to automatically subtract the value measured when the testing leads are short-circuited from the reading.
- For high-resistance measurement (>1MΩ), it normally requires several seconds to obtain a stable reading.
- If Ω reading with shorted test leads is not ≤0.5Ω, check for loose test leads, incorrect function selection, or enabled Data Hold function.
- The LCD displays **OL** indicating open-circuit for the tested resistor or the resistor value is higher than the maximum range of the Meter.
- When resistance measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

C. Capacitance Measurement (see figure 8)



(figure 8)

Measurement Operation (7)

⚠ Warning
To avoid damage to the Meter or to the equipment under test, disconnect circuit power and discharge all high-voltage capacitors before measuring capacitance.
Use the DC Voltage function to confirm that the capacitor is discharged. Never attempt to input over 60V DC or 30V rms AC to avoid personal injury.

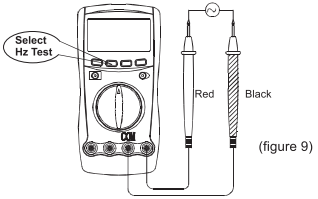
The Meter's capacitance ranges are: 40.00nF, 400.0nF, 4.000μF, 40.00μF, and 100.0μF. To measure capacitance, connect the Meter as follows:

1. Insert the red test lead into the **HzVΩ** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to ⊣⊢.
3. Connect the test leads across with the object being measured.
   The measured value shows on the display.

Note
- For testing a polarited capacitor , connect the red test lead to anode & black test lead to cathode instead.
- To increase the accuracy of capacitance measurement especially when measuring under 400nF, use REL mode to automatically subtract the Meter built-in equalized capacitance and residual capacitance of test leads from the result.
- It will take longer to test high capacitor values. the test time is around 15 seconds in 100μF range.
- When capacitance measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

Measurement Operation (8)

D. Frequency & Duty Cycle Measurement (see figure 9)



(figure 9)

Frequency Measurement

The measurement ranges are from 10Hz to 10MHz. To measure frequency, connect the Meter as follows:

1. Insert the red test lead into the **HzVΩ** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to **Hz%**; frequency measurement (Hz) is default or press **Hz%** button to select Hz measurement mode.
3. Connect the test leads across with the object being measured.
   The measured value shows on the display.

Note

- To obtain a stable reading when measuring:
  Input scope > 30V rms & ⩽ 1 kHz frequency signal:
  Set the rotary switch to **Hz≂V**, **μA≂Hz**, **mA≂Hz** or **Hz≂A**.
  Then press **Hz%** to select Hz measurement mode to obtain frequency value.
  Input scope ⩽30V rms frequency signal:
  Follow the above step 2 carrying out the measurement.
- When making frequency measurement at voltage or current range, please mind the following signal requirement table:

Measurement Operation (9)

Range	Signal Requirement	Frequency Range
V ~	⩾200mV	10Hz~1kHz
μA ~	⩾200μA	
mA ~	⩾20mA	
A ~	⩾2A	

- When Hz measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

Duty Cycle Measurement

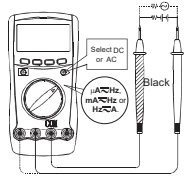
The duty cycle measurement range is 0.1% ~ 99.9%.

To measure duty cycle:
1. Set up the Meter to measure frequency.
2. To select duty cycle, press **Hz** again (or until the % symbol is shown on the display).
3. Connect the test leads across with the object being measured.
   The measured value shows on the display.

Note
- The LCD displays 000.0% indicating the input signal is high or low level.
- To obtain a stable reading when measuring:
  Input scope > 30V rms & ⩽ 1 kHz frequency signal:
  Set the rotary switch to **Hz≂V**, **μA≂Hz**, **mA≂Hz** or **Hz≂A**.
  Then press **Hz%** to select Hz measurement mode to obtain frequency value.
  Input scope ⩽30V rms frequency signal:
  Follow the above step 2 carrying out the measurement.
- When duty cycle measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

Measurement Operation (10)

E. DC or AC Current Measurement (see figure 10)



(figure 10)

⚠ Warning

Never attempt an in-circuit current measurement where the open-circuit voltage between the circuit and ground is greater than 250V.
If the fuse burns out during measurement, the Meter may be damaged and the operator may be injured. Use proper terminals, function, and range for the measurement. When the test leads are connected to the current terminals, do not parallel them across any circuit.

The current measurement has 3 measurement positions on the rotary switch: **μA≂Hz**, **mA≂Hz** and **Hz≂A**.

The **μA≂Hz** has a 400.0μA and 4000μA range, with auto ranging; the **mA≂Hz** has a 40.00mA and 400.0mA range, with auto ranging; **Hz≂A** position has a 4.000A and 10.00A range, with auto ranging.

To measure current, do the following:

1. Turn off power to the circuit. Discharge all high-voltage capacitors.
2. Insert the red test lead into the **μAmA** or **10A** or terminal and the black test lead into the **COM** terminal.
3. Set the rotary switch to **μA≂Hz**, **mA≂Hz** or **Hz≂A.** Use the **10A** terminal and **Hz≂A** measurement position if the current value to be tested is an unknown.

Measurement Operation (11)

4. The Meter defaults to DC current measurement mode. To toggle between DC and AC current measurement function, press **BLUE** button.
   AC current is displayed as an mean value (calibrated against sine wave effective value).
5. Break the current path to be tested. Connect the red test lead to the more positive side of the break and the black test lead to the more negative side of the break.
6. Turn on power to the circuit.
   The measured value shows on the display.

Note

- For safety sake, the measuring time for high current should be ≤10 seconds for each measurement and the interval time between 2 measurements should be greater than 15 minutes.
- When current measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

The POWER button

This is a self-lock switch use to turn on or off the power of the Meter.

The BLUE button

Selects the required measurement function when there is more than one function at a position of the rotary switch.

The Use of Relative Value Mode

The REL mode applies to all measurement functions except in frequency/duty cycle measurement, it subtracts a stored value from the present value and displays the relative value (Δ) as the result.

The definition is as follows:

- Relative value (Δ) = present value - stored value
  For instance, if the stored value is 20.0V and the present value is 22.0V, the reading would be 2.0V. If a new measurement value is equal to the stored value then display 0.0V.

To enter or exit REL mode:

- Use rotary switch to select the measurement function before selecting **REL**Δ. If measurement functions change manually after **REL**Δ is selected, the Meter exits the REL mode.
- Press **REL**Δ to enter REL mode, autoranging turns off except under capacitance testing mode, and the present measurement range is locked and display the last measurement value as "0" as the stored value.
- Press **REL**Δ again or turn the rotary switch to reset the stored value and exit REL Mode.

Pressing **HOLD**[H] in REL mode makes the Meter stop updating. Pressing **HOLD**[H] again to resume updating.

Operation of Hold Mode

⚠ Warning

To avoid possibility of electric shock, do not use Hold mode to determine if circuits are without power. The Hold mode will not capture unstable or noisy readings.

The Hold mode is applicable to all measurement functions.

- Press **HOLD** [H] to enter Hold mode; the Meter beeps.
- Press **HOLD** [H] again or turn the rotary switch to exit Hold mode; the Meter beeps.
- In Hold mode, **H** is displayed.

General Specifications

- Maximum Voltage between any Terminals and Ground: 1000V rms.
- ⚠ Fused Protection for μ AmA Input Terminal: 0.5A, 250V fast type Glass fuse, φ5x20 mm.
- ⚠ Fused Protection for 10A Input Terminal: 10A, 250V fast type Glass fuse, φ5x20 mm.
- Maximum Display: Display: 3999.
- Measurement Speed: Updates 3 times /second.
- Temperature: Operating: 0°C~40°C (32°F ~104°F).
  Storage: -10°C~50°C(14°F~122°F).
- Relative Humidity: ≤75% @ 0°C - 30°C; ≤50% @ 31°C- 40°C.
- Altitude:Operating: 2000 m; Storage: 10000 m.
- Battery Type: One piece of 9V NEDA1604 or 6F22 or 006P.
- Low Battery: Display 🔋.
- Data Hold: Display H.
- Negative reading: Display −.
- Overload: Display OL.
- Equipped with full icons display.
- Auto and manual range selectable.
- Dimensions (HxWxL): 177 x 85 x 40 mm.
- Weight: Approximate 300g (battery included).
- Safety/Compliances: IEC61010 CAT.III 1000V, CAT.IV 600V overvoltage and double insulation standard.
- Certification: CE UL & CUL

Accuracy Specifications (1)

Accuracy: ±(a% reading + b digits) guarantee for 1 year.
Operating temperature: 23°C±5°C.
Relative humidity: <75%.
Temperature coefficient: 0.1 x (specified accuracy) / 1°C.

A. AC Voltage

Range	Resolution	Accuracy	Overload Protection
4V	1mV	±(1%+5)	1000V DC 750V AC rms continuous.
40V	10mV		
400V	100mV		
750V	1V	±(1.2%+5)	

Remarks:
- Input impedance ≥10MΩ.
- Displays effective value of sine wave (mean value response).
- Frequency response 40Hz ~ 400Hz.

B. DC Voltage

Range	Resolution	Accuracy	Overload Protection
400mV	0.1mV	±(0.8%+3)	1000V DC 750V AC rms continuous.
4V	1mV	±(0.8%+1)	
40V	10mV		
400V	100mV		
1000V	1V	±(1%+3)	

Remark: Input impedance ≥10MΩ.

Accuracy Specifications (2)

C. Continuity, Diode & Resistance Test

Range	Resolution	Accuracy	Overload Protection
Continuity Test (400.0Ω)	0.1Ω	Approximate ⩽ 100Ω	600Vp
Diode	1mV	N/A	
400Ω	0.1Ω	±(1.2%+2)	
4kΩ	1Ω	±(1%+2)	
40kΩ	10Ω		
400kΩ	100Ω		
4MΩ	1kΩ	±(1.2%+2)	
40MΩ	10kΩ	±(1.5%+2)	

Remarks:

- **Continuity Test (400.0Ω) Range:**
  Buzzer beeps continuously.
  Open circuit voltage approximate 0.45V.
- **Diode Range:**
  Open circuit voltage approximate 1.48V.
  Displays approximate forward voltage drop reading 0.5V~0.8V.
- **400Ω~ 40MΩ Range:**
  Open circuit voltage approximate 0.45V.

Accuracy Specifications (3)

D. Capacitance

Range	Resolution	Accuracy	Overload Protection
40nF	10pF	± (3%+5)	600Vp
400nF	100pF		
4μF	1nF		
40μF	10nF		
100μF	100nF	±(4%+5)	

E. Frequency & Duty Cycle

Range	Resolution	Accuracy	Overload Protection
10Hz~ 10MHz	N/A	± (0.1%+3)	600Vp
0.1%~ 99.9% (Duty cycle)	0.01%	N/A	

Remarks:

- **10Hz~10MHz Range:**
  Input sensitivity as follows:
  ≤1MHz: ≤300mV rms;
  >1MHz: ≤600mV rms.
  Maximum input amplitude: 30V rms.
- **0.1%~99.9% Range:**
  Reading is only for reference purpose.

Accuracy Specifications (4)

F. DC Current

Range	Resolution	Accuracy	Overload Protection
400μA	0.1μA	±(1%+2)	0.5A, 250V, fast type Glass fuse, ϕ 5x20mm
4000μA	1μA		
40mA	0.01mA	±(1.2%+3)	
400mA	0.1mA		
4A	0.001A	±(1.5%+5)	10A, 250V, fast type Glass fuse, ϕ 5x20mm
10A	0.01A		

Remark:

- **4A & 10A Range:**
  For continuous measurement ≤10 seconds and interval time between 2 measurements greater than 15 minutes.

G. AC Current

Range	Resolution	curacy	Overload Protection
400μA	0.1μA	±(1.5%+5)	0.5A, 250V, fast type Glass fuse, ϕ 5x20mm
4000μA	1μA		
40mA	0.01mA	±(2%+5)	
400mA	0.1mA		
4A	0.001A	±(2.5%+5)	10A, 250V, fast type Glass fuse, ϕ 5x20mm
10A	0.01A		

Remarks:

- Frequency response 40Hz ~ 400Hz.
- Displays effective value of sine wave (mean value response).
- **4A & 10A Range:**
  For continuous measurement ≤10 seconds and interval time between 2 measurements greater than 15 minutes.

Maintenance (1)

This section provides basic maintenance information including battery and fuse replacement instructions.

⚠ Warning
Do not attempt to repair or service your Meter unless you are qualified to do so and have the relevant calibration, performance test, and service information. To avoid electrical shock or damage to the Meter, do not get water inside the case.

A. General Service

- Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents.
- To clean the terminals with cotton bar with detergent, as dirt or moisture in the terminals can affect readings.
- Press the **POWER** to turn off the Meter when it is not in use and take out the battery when not using for a long time.
- Do not store the Meter in a place of humidity, high temperature and strong magnetic field.

B. Testing the Fuses

⚠ Warning
To avoid electrical shock or personal injury, remove the test leads and any input signals before replacing the battery or fuse.
To prevent damage or injury, install ONLY replacement fuses with identical amperage, voltage, and speed ratings.

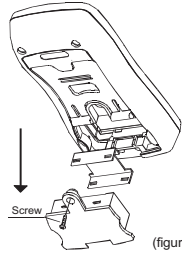
Maintenance (2)

To test the fuse:

1. Set the rotary switch to •))→|← Ω and select •)) by pressing **BLUE** button.
2. Plug a test lead into the terminal **HzVΩ** and touch the probe tip to the **10A** or **μAmA** terminal.
   - If the Meter beeps, the fuse is good.
   - If the display shows **OL**, replace the fuse and test again.
   - If the display shows any other value, have the Meter serviced and contact your dealer immediately.

If the Meter does not work while the fuse is all right, send it to your dealer for repair.

C. Replacing the Battery (see figure 11)



(figure 11)

⚠ Warning

To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator " ▯ " appears.

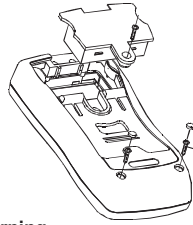
To replace the battery:

1. Press the **POWER** to turn the Meter off and remove all connections from the terminals.

Maintenance (3)

2. Remove the screw from the battery compartment, and separate the battery compartment from the case bottom.
3. Remove the battery from the battery compartment.
4. Replace the battery with a new 9V battery (NEDA1604, 6F22 or 006P).
5. Rejoin the case bottom and battery compartment, and reinstall the screw.

D. Replacing the Fuses (see figure 12)



(figure 12)

⚠ Warning

To avoid electrical shock, arc blast, personal injury or damage to the Meter, use specified fuses ONLY in accordance with the following procedure.

To replace the Meter's fuse:

1. Press the **POWER** to turn the Meter off and remove all connections from the terminals.
2. Remove the screw from the battery compartment, and separate the battery compartment from the case bottom.
3. Remove the 2 rubber feet and 2 screws from the case bottom, and separate the case top from the case bottom.
4. Remove the fuse by gently prying one end loose, and then take out the fuse from its bracket.

Maintenance (4)

5. Install ONLY replacement fuses with the identical type and specification as follows and make sure the fuse is fixed firmly in the bracket.
   Fuse 1:0.5A, 250V, fast type Glass fuse, ϕ5x20mm.
   Fuse 2: 10A, 250V, fast type Glass fuse, ϕ5x20 mm.
6. Rejoin the battery compartment and the case top, and reinstall the screw.
7. Rejoin the case bottom and case top, and reinstall the 2 screws and 2 rubber feet.

Replacement of the fuses is seldom required. Burning of a fuse always results from improper operation.

RS232C Serial Port (1)

A. RS232C Port Cable

The Meter		Computer			
D-sub 9 Pin Male		D-sub 9 Pin Female	D-sub 25 Pin Female	Pin Name	Remark
2	----	2	3	RX	Receiving Data
3	----	3	2	TD	Transmitting Data
4	----	4	20	DTR	Data Terminal Ready
5	----	5	7	GND	Ground
6	----	6	6	DSR	Data Set Ready
7	----	7	4	RTS	Request To Send
8	----	8	5	CTS	Clear To Send

B. Setting of RS232C Serial Ports

Default of RS232C serial port for communication is set as:

Baud Rate 2400
Start bit 1 (always 0)
Stop bit 1 (always 1)
Data bits 8
Parity 1 (Odd)

RS232C Serial Port (2)

C. System Requirements for Installing the serial Interface Program

To use **serial Interface Program**, you need the following hardware and software:

- An IBM PC or equivalent computer with 80486 or higher processor and 640 x 480 pixel or better monitor.
- Microsoft Windows 95 or above.
- At least 8MB of RAM.
- At least 8MB free hard drive space.
- Access to a CD-ROM drive.
- A vailable serial port.
- A mouse or other pointing device supported by Windows.

Please refer to the included **"Installation Guide & Computer Interface Software"** for installing and operating instructions of the **serial Interface Program**.

~ END ~

This operating manual is subject to change without notice.

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