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.

Your multimeter is an intelligent digital one, a precise instrument with a resolution of 8,000 counts and up-to-date automatic computer calibrating function. High resolution A/D converter and micro-controller data processing technique is adopted in the Meter, featured with intelligence, high precision and multi-functions. The Meter can be widely used in laboratory, field service, domestic and other applications. All the functions and ranges have overloaded protection.

Unpacking Inspection

Open the package case and take out the Meter. Check the following items carefully to see any missing or damaged part:

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

In the event you find any missing or damage, please contact your dealer immediately.

Safety Information

CE Version: The Meter complies with the standards IEC61010-1:in pollution degree 2, overvoltage category CAT III 1000V, CAT IV 600V and double insulation .
UL Version: The Meter complies with the standards UL61010B-1, in pollution degree 2, overvoltage category CAT II 1000V and double insulation.

CAT. II: Local level, appliance, PORTABLE EQUIPMENT etc., with smaller transient voltage overvoltages than CAT. III

CAT. III: Distribution level, fixed installation, with smaller transient overvoltages than CAT. IV

CAT IV: Primary supply level, overhead lines, cablesystems 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 on.

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 grounding.**
- **The rotary switch should be placed in the right position and no any changeover of range shall be made during measurement is conducted to prevent damage of the Meter.**
- **Never working at an effective voltage over 60V in DC or 30V rms in 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, inflammable 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.**

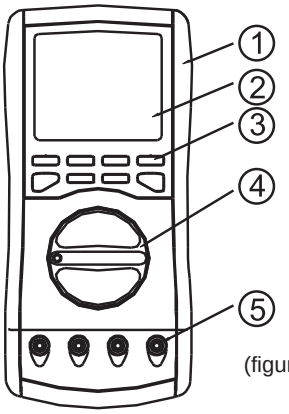
Rules For Safe Operation (2)

- Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, conductance, continuity, diodes, current, or capacitance.
- Before measuring current, check the Meter's fuses and turn off power to the circuit before connecting the Meter to the circuit.
- 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, RS232C interface cable and test clip 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 for indoor use.
- Turn off the Meter when it is not in use and take out the battery when not using for a long time.
- Constantly check the battery as it may leak when it has been using for some time, replace the battery as soon as leaking appears. A leaking battery will damage the Meter.

International Electrical Symbols

~	AC (Alternating Current)
⎓	DC (Direct Current)
≂	AC or DC
⏚	Grounding
⧈	Double Insulated
⊟	Deficiency of Built-In Battery
•))	Continuity Test
⊣▷⊢	Diode
⊣(	Capacitance Test
▭	Fuse
⚠	Warning. Refer to the Operating Manual
CE	Conforms to Standards of European Union

The Meter Structure (see figure 1)



(figure 1)

① Front Case
② LCD Display
③ Functional Buttons
④ Rotary Switch
⑤ Input Terminals

Rotary Switch

Below table indicated for information about the rotary switch positions.

Rotary Switch Position	Function
OFF	Power is turned off.
V~	AC voltage measurement.
V⎓	DC voltage measurement.
mV⎓	DC millivolt measurement.
•))Ω⊣⊢	•)) : Continuity test.
	Ω : Resistance measurement.
	⊣⊢ : Capacitance test.
→⊢	Diode Test.
A≂	AC or DC Current Measurement from 0.001A to 10.00A .
mA≂	AC or DC Current Measurement from 0.1mA to 800.0mA.

Functional Buttons (1)

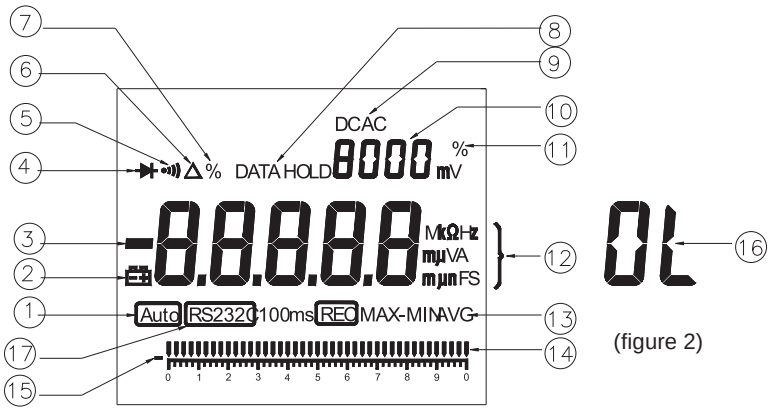
Below table indicated for information about the functional button operations.

Button	Measuring Function	Operation Performed
•))	Continuity Test	Turn the continuity buzzer on and off in resistance measurement mode.
	At **OFF** position	Press •)) while turning on the Meter to disable the beeper at all functions except short circuit and diode testing.
	At REC mode or REC mode plus Hold mode	To toggle between 100ms response time and 1ms response time under REC mode except at resistance, capacitance and continuity range.
MAX MIN	Any rotary switch position except at conductance mode.	Starts recording of maximum and minimum values. Steps the display through the sequence of present, high (MAX), low (MIN) and average (AVG) readings at any mode. In 1ms response time, it steps through only MAX and MIN reading.
	At **OFF** position	To select 1 second high accuracy response time, press and hold down **MAX MIN** while turning the rotary switch to any function setting.
RANGE	Any rotary switch position	1. Press **RANGE** to enter the manual ranging mode; the Meter beeps. 2. Press **RANGE** to step through the ranges available for the selected function; the Meter beeps. 3. Press and hold **RANGE** for over 1 second to return to autoranging; the Meter beeps.

Functional Buttons (2)

HOLD	Any rotary switch position	Press **HOLD** to enter and exit the Hold mode in any mode; the Meter beeps.
	Conductance mode	Press **HOLD** to toggle between conductance and resistance value. Present resistance value is kept.
⊣⊢≂	•))Ω⊣⊢	Press ⊣⊢≂ to select capacitance test.
	A≂, mA≂	Press ⊣⊢≂ to select DC or AC current. DC is default.
	At **OFF** position	To disable the Sleep Mode, press ⊣⊢≂ while turning on the Meter.
REL Δ	Any rotary switch position	Press **REL Δ** to enter and exit the Δ and Δ% mode in any measuring mode; the Meter beeps.
Hz	**V≂, V⎓, mV⎓, A≂, mA≂**	1. Press **Hz** to enter frequency measurement mode; the Meter beeps. 2. Press **Hz** again to enter duty cycle measurement mode; the Meter beeps. 3. Press **Hz** again to return to the last measurement mode; the Meter beeps.
☀	Display Backlight	Press ☀ once to turn the Display Backlight on and it shall shut off automatically in around 60 seconds later.

Display Symbols (1) (see figure 2)



(figure 2)

No.	Symbol	Meaning
①	Auto	The Meter is in the auto range mode in which the Meter automatically selects the range with the best resolution.
②		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.**
③	−	Indicates negative reading.
④		Test of diode.
⑤		The continuity buzzer is on.
⑥	Δ	The relative value mode is on, which display the present value minus the stored value.
⑦	Δ %	The relative percentage value mode is on. It displays the percentage value of the relative value and stored value.
⑧	DATA HOLD	Data hold is active.
⑨	**DC AC**	Indicator for DC/AC voltage or current. The displayed value is the mean value.
⑩	**8000mV**	Display the present chosen range.
⑪	**%**	Percent, used for duty cycle measurements.

Display Symbols (2)

⑫	**Ω, kΩ, MΩ**	Ω: KΩ: MΩ:	Ohm. The unit of resistance. kilohm. 1 x 10^3 or 1000 ohms. Megohm. 1 x 10^6 or 1,000,000 ohms.
	Hz, kHz, MHz	Hz: kHz: MHz:	Hertz. The unit of frequency. Kilohertz. 1 x 10^3 or 1000 hertz. Meghertz. 1 x 10^6 or1,000,000 hertz.
	V, mV	V: mV:	Volts. The unit of voltage. Millivolt. 1 x 10^{-3} or 0.001 volts.
	A, mA	A: mA:	Amperes (amps). The unit of current. Milliamp. 1 x 10^{-3} or 0.001 amperes.
	F, μF, nF	F: μF: nF:	Farad. The unit of capacitance. Microfarad. 1 x 10^{-6} or 0.000001 farads. Nanofarad. 1 x 10^{-9} or 0.000000001 farads.
	nS	S: nS:	Siemens. The unit of conductance. Nanosiemens. 1 x 10^{-9} or 0.000000001 siemens.
⑬	REC	Maximum, minimum and average recording mode enabled. Present reading displayed.	
	100ms	100ms response time.	
	MAX	Maximum reading displayed.	
	MIN	Minimum reading displayed.	
	AVG	Average reading displayed.	
⑭	**Analogue Bar Graph**	Provides an analogue indication of the present input, quick response.	
⑮	—	Polarity indicator for the analogue bar graph display, no display for positive.	
⑯	OL	The input value is too large for the selected range.	
⑰	RS232C	Computer and the Meter is connected properly. Data output is in progress.	

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.

To enter and exit the manual range mode:

Measurement Ranges (2)

1. Press **RANGE**.
   The Meter enters the manual range mode and Auto turns off.
   Each presses of **RANGE** increments the range. When the highest range is reached, the Meter wraps to the lowest range.

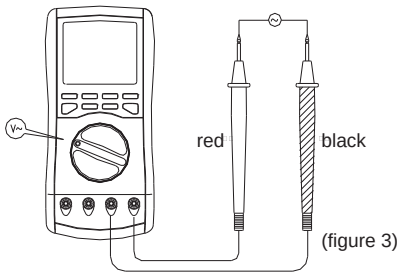
2. To exit the manual range mode, press and hold **RANGE** for over one second.
   The Meter returns to the autorange mode and Auto is displayed.

Note

- In Hold and MAX MIN mode, press **RANGE** exits these measurement modes and enters manual range mode.
- In Hz measurement mode, press **RANGE** to attenuate 10 times of input signal amplitude which can increase the Meter sensitivity and stabilize the correct reading.

Measurement Operation (1)

A. AC Voltage Measurement (see figure 3)



(figure 3)

⚠Warning

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

The AC Voltage ranges are: 800.0mV, 8.000V, 80.00V, 800.0V and 1000V. To measure AC Voltage, connect the Meter as follows:

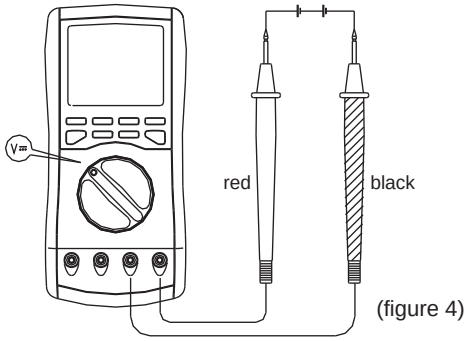
1. Insert the red test lead into the **⊣⊢VΩHz** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to **V~**.
3. Connect the test leads across with the object being measured.
   The measured value shows on the display, which is effective value of sine wave (mean value response).

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.

Measurement Operation (2)

B. DC Voltage Measurement (see figure 4)



(figure 4)

Warning

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

The DC Voltage ranges are: 8.000V, 80.00V, 800.0V and 1000V. To measure DC Voltage, connect the Meter as follows:

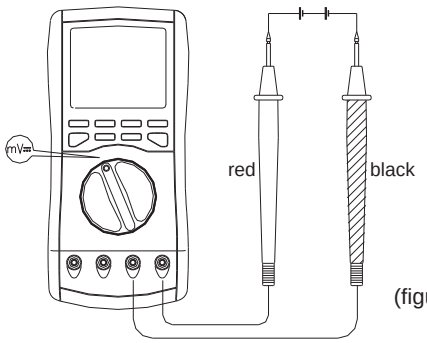
1. Insert the red test lead into the **⊣⊢VΩHz** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to **V ⎓**.
3. Connect the test leads across with the object being measured.
   The measured value shows on the display.

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 DC voltage measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

Measurement Operation (3)

C. DC Millivolt Measurement (see figure 5)



(figure 5)

Warning

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

The DC Millivolt ranges are: 80.00mV and 800.0mV. These ranges have more than 4000MΩ. To measure DC Millivolt, connect the Meter as follows:

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

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 DC millivolt measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

Measurement Operation (4)

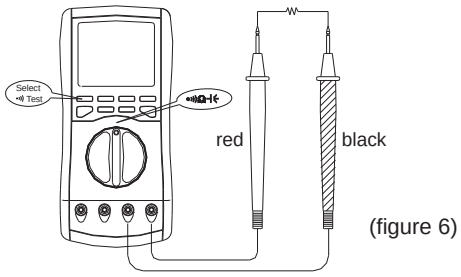
D. Measuring Continuity, Resistance, Conductance & Capacitance

Warning

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

When measuring capacitance, use the DC Voltage function to confirm that the capacitor is discharged. Never attempt to input over 60V in DC or 30V rms in AC to avoid personal dangerous.

Testing for Continuity (see figure 6)



(figure 6)

To test for continuity, connect the Meter as below:

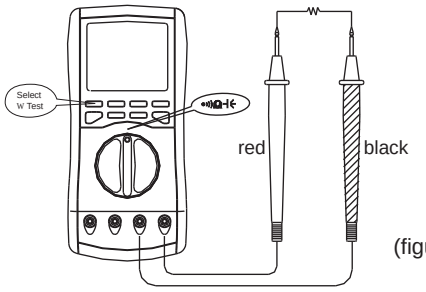
1. Insert the red test lead into the **⊣⊢VΩHz** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to •)) Ω ⊣⊢ and press •)) to select •)) measurement mode.
3. The buzzer sounds if the resistance of a circuit under test is less than 100Ω .

Note

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

Measurement Operation (5)

Resistance Measurement (see figure 7)



(figure 7)

The resistance ranges are: 800.0Ω, 8.000kΩ, 80.00kΩ, 800.0kΩ , 8.000MΩ and 80.00MΩ . To measure resistance, connect the Meter as follows:

1. Insert the red test lead into the **⊣⊢VΩHz** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to •))Ω⊣⊢, resistance measurement is default or press •)) to select Ω measurement mode.
3. Connect the test leads across with the object being measured.
   The measured value shows on the display.

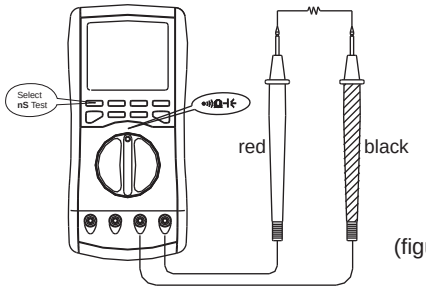
Note

- The test leads can add 0.1Ω to 0.2Ω of error to resistance measurement. To obtain precision readings in low-resistance measurement, that is the range of 800.0Ω, 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 is normal taking several seconds to obtain a stable reading.

Measurement Operation (6)

- 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.

Conductance Measurement (see figure 8)



(figure 8)

The resistance ranges from 0.01nS to 80nS. To measure conductance, connect the Meter as follows:

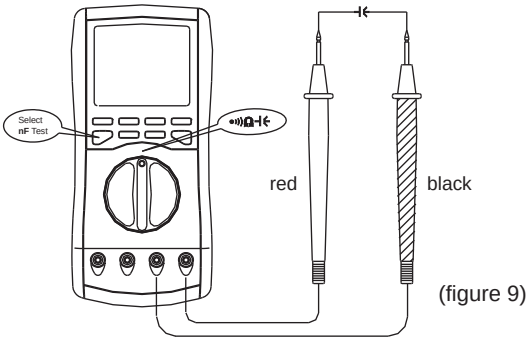
1. Insert the red test lead into the **VΩHz** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to •))Ω and press **RANGE** to select nS measurement mode.
3. Connect the test leads across with the object being measured.
   The measured value shows on the display.

Note

- It is possible to press **HOLD** to toggle between conductance and resistance value during the measurement of conductance.
- When conductance measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

Measurement Operation (7)

Capacitance Measurement (see figure 9)



(figure 9)

The Meter's capacitance ranges are: 1.000nF, 10.00nF, 100.0nF, 1.000μF, 10.00μF and 100.0μF. To measure capacitance, connect the Meter as follows:

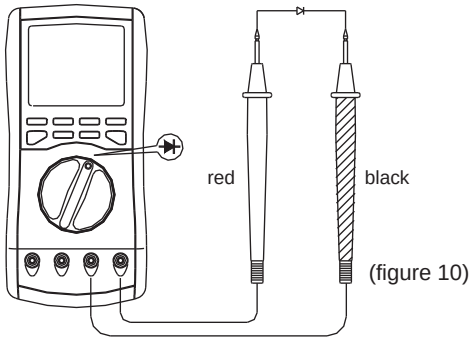
1. Insert the red test lead or the red test clip into the **⊣⊢VΩHz** terminal and the black test lead or black test clip into the **COM** terminal.
2. Set the rotary switch to •))ΩH⊣ and press ⊣⊢≂ to select nF measurement mode.
3. Connect the test leads or the test clips across with the object being measured.
   The measured value shows on the display.

Note

- For testing the capacitor with polarity, connect the red test clip or red test lead to anode & black test clip or black test lead to cathode instead.
- It takes a longer time when testing a high capacitor value, the testing 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)

E. Testing Diodes (see figure 10)



(figure 10)

Warning

To avoid possible damage to the Meter and to the device under test, disconnect circuit power and discharge all high-voltage capacitors before testing diodes.

Use the diode test to check diodes, transistors, and other semiconductor devices. The diode test sends a current through the semiconductor junction, 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:

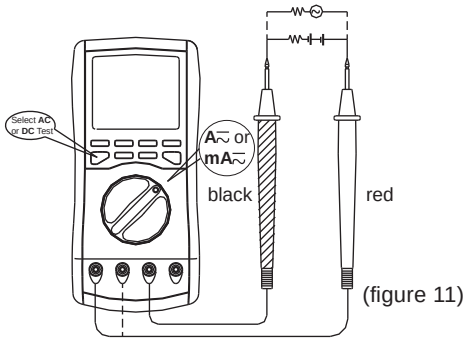
1. Insert the red test lead into the **⊣⊢VΩHz** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to ⊣◁⊢.
3. For forward voltage drop readings on any semiconductor component, place the red test lead on the component's anode and place the black test lead on the component's cathode.
   The measured value shows on the display.

Measurement Operation (9)

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 testing leads and the circuit under test.

F. DC or AC Current Measurement (see figure 11)



(figure 11)

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 or the operator himself may be hurt. Use proper terminals, function, and range for the measurement. When the testing leads are connected to the current terminals, do not parallel them across any circuit.

Measurement Operation (10)

The current measurement has 2 measurement positions on the rotary switch: **A⎓** and **mA⎓**.

The A has a 8.000A and 10.00A range, with auto ranging; the mA has a 80.00mA and 800.0mA range, with auto ranging.

To measure current, do the following:

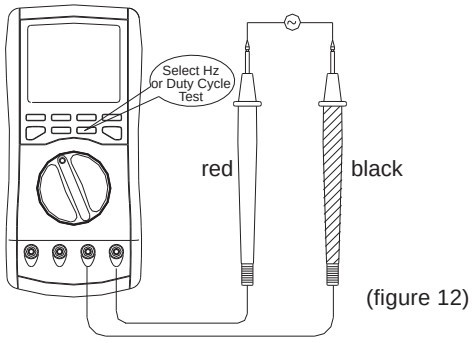
1. Turn off power to the circuit. Discharge all high-voltage capacitors.
2. Insert the red test lead into the **A** or **mA** or terminal and the black test lead into the **COM** terminal.
3. Set the rotary switch to **A⎓** or **mA⎓.**
   Use the **A** terminal and **A⎓** measurement position if the current value to be tested is an unknown.
4. The Meter defaults to DC current measurement mode. To toggle between DC and AC current measurement function, press ⊣⊢⎓.
   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, that is 8.000A and 10.00A range, 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.

Measurement Operation (11)

G. Frequency & Duty Cycle Measurement (see figure 12)



(figure 12)

Frequency Measurement

The measurement ranges are: 1kHz, 10kHz, 100kHz and 1MHz. The maximum measurement range is 1MHz. To measure frequency, connect the Meter as follows:

1. Insert the red test lead into the **⊣⊢VΩHz** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to any voltage or current measurement positions.
3. Press **Hz** to display the frequency of present signal.
4. Connect the test leads across with the object being measured.
   The measured value shows on the display.

Note

- It is recommended to use **mV⎓** range which has the highest sensitivity.
- The attenuate amplitude of signal is different from different measuring positions and ranges, therefore the required input amplitude is different when measuring frequency at different measuring positions and ranges.
- When **Hz** measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

Measurement Operation (12)

Duty Cycle Measurement

The duty cycle measurement range is 0.01% ~ 99.99%.

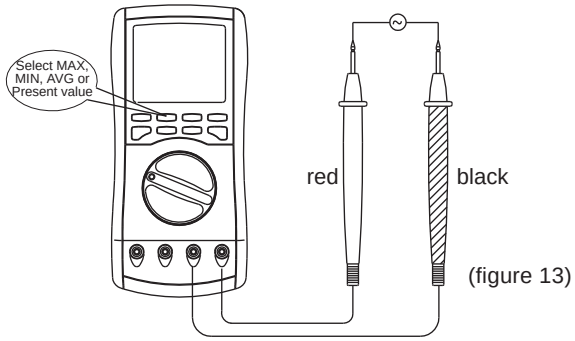
To measure duty cycle:

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

- It is recommended to use **mV⎓** range.
- The polarity of trigger slope is positive.
- The attenuate amplitude of signal is different from different measuring positions and ranges, therefore the required input amplitude is different when measuring duty cycle at different measuring positions and ranges.
- When duty cycle measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

MAX MIN Recording Mode (1) (see figure 13)



(figure 13)

MAX MIN recording mode applies to all measurement functions except at conductance measurement function.

MAX MIN recording mode captures and stores the maximum and minimum input value detected, and calculates a running average of all readings taken.

In the MAX MIN mode, when the Meter detects an input that is below the recorded minimum or above the recorded maximum, the Meter beeps and records the new minimum (**MIN**) or maximum (**MAX**) value.

In the MAX MIN mode, you can also display a running average of all readings taken since the MAX MIN mode was activated. Displaying the average reading allows you to "smooth" a rapidly changing input by displaying a stable reading on the digital display.

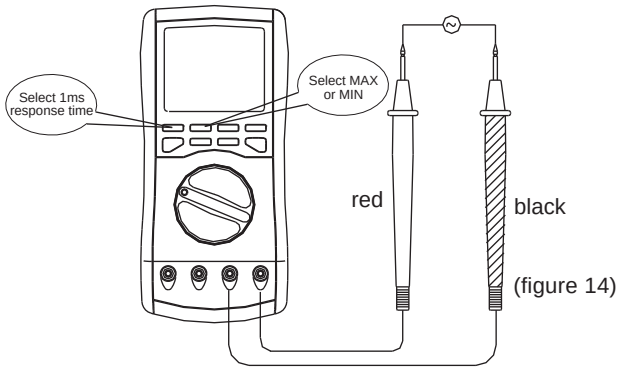
The MAX MIN mode has a pre-set response time of 100ms. A shorter response time captures shorter events, but with decreased accuracy. If you want 1 second response time, that can be selected after power on the Meter.

To use the MAX MIN mode as follows:

MAX MIN Recording Mode (2)

MAX MIN Function	Action
To enter the MAX MIN mode.	1. Make sure that the Meter is in the desired measurement function and range. 2. Press **MAX MIN** to enter MAX MIN recording mode. The present reading is displayed, and the Meter is locked in the present range, and REC is displayed. 3. Each time a new low or high value is recorded, the Meter beeps and displays a new reading. (In MAX MIN mode, Sleep Mode function will be disabled.)
To view the **MAX**, **MIN**, **AVG** or present reading.	Press **MAX MIN** to step through on the sequence of present readings, high **(MAX)**, low **(MIN)** and average **(AVG)** readings.
To stop and resume recording without erasing stored values	l Press **HOLD** to stop recording, the recorded values will not erase. l Press **HOLD** again to resume recording.
To select response time	l The pre-set response time is 100ms. l Press •)) to select 1 ms response time in REC mode. It is called under PEAK MAX MIN mode. (In 1 ms response time, it steps through on the sequence of MAX and MIN readings only.) l With the rotary switch in the **OFF** position, press and hold down **MAX MIN** while turning on the rotary switch to select 1 second high accuracy response time. (MAX MIN readings for the frequency counter are recorded only in the 1 second, high accuracy response mode.)
To exit the MAX MIN mode.	Press **MAX MIN** for over 1 second. The Meter exists MAX MIN. Recorded values are erased and the Meter stays in the selected range.

PEAK MAX MIN Mode (see figure 14)



(figure 14)

PEAK MAX MIN mode is an additional function of •)). Pressing •)) to toggle between 100ms response time and 1ms response time. This function can only be enabled when the Meter is under REC mode or REC mode plus Hold mode except at •)) Ω ⊣⊢ mode.

To enter PEAK MAX MIN mode:

- Press **MAX MIN** or **MAX MIN** and **HOLD** to enter REC mode.
- Then press •)) to enter PEAK MAX MIN mode (1ms response time), it steps through the sequence of MAX and MIN reading ONLY.

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. With the Auto Hold function, it automatically holds the present reading on the display, freeing you to concentrate on the placement of the test leads when working in dangerous or difficult situations.

- Press **HOLD** to enter Hold mode; the Meter beeps.
- Press **HOLD** again or **RANGE** or turn the rotary switch to exit Hold mode; the Meter beeps.
- In Hold mode, DATA HOLD is displayed on the LCD.
- In conductance measurement mode, press **HOLD** to toggle between resistance and conductance value. Present resistance value is kept.
- The Meter displays *OL* when the selected range is overloaded.
- The Meter beeps when a positive result is obtained from continuity test, whether it is under the Hold mode or not.
- If you are in MAX MIN recording mode or Δmode when **HOLD** is selected, Hold interrupts the function. The display does not update, but recorded readings are not erased. Press **HOLD** again to resume recording.

Operation of Auto Hold Mode

Auto Hold means you no need to press **HOLD**, the readings on the LCD will be hold automatically.

Conditions to enter Auto Hold Mode:

- When input signal is larger than AC/DC 100mV, Auto Hold mode will be enabled automatically.
- When the change of signal three times continuously within ±3 digits, it will hold the last value; the Meter beeps.
- Considers every value as the base value. When the Meter detects an input which is above the base value ±300 digits, the Meter beeps, and holds and displays the value as the new base value.

The Use of Relative Value and Relative Percentage Value Mode

The Δ and Δ% mode applies to all measurement functions, with auto ranging.
REL mode can be used together with Auto Hold and MAX MIN mode.

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.
- Relative percentage value (Δ%) =
  (relative value Δ ÷ stored value) X 100%

To enter or exit Δ and Δ% mode:

- Use rotary switch to select the desired 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 Δ mode, and the present measurement range is locked and display the last measurement value as "0" as the stored value. Then if carrying out measurement at this time, the LCD will display the Δ value as the result.
- Press **REL** Δ again to enter **Δ%** mode, and the present measurement range is locked and display the last measurement value as "0" as the stored value. Then if carrying out measurement at this time, the LCD will display the **Δ%** value as the result.
- Press **REL** Δ again or turn the rotary switch to reset the stored value and exit **Δ%** and Δ mode, returning to normal measurement mode.

Turning on the Display Backlight

Warning
In order to avoid the hazard arising from mistaken readings in insufficient light or poor vision, please use the Display Backlight function.

- Press ☀ to turn on the Display Backlight and it will automatically off after about 60 seconds.
- Press and hold ☀ for about 2 seconds to turn the Display Backlight off.

Analogue Bar Graph Display

The analogue bar graph likes the needle in a traditional analogue meter (AMM). It refreshes 50 times a sec, which is 10 times faster than that of digital display and is applied to zero adjustment and observation of rapidly changing signal that make digital display hard to read.

The analogue display is divided uniformly into 10 scales and composed of 41 segments; of which the full-range value corresponds to the full-range value of the measurement range that has been selected. The polarity of the measured value is displayed as "-" on the left of the analogue display: positive polarity is not displayed. For example, when 80V range is selected, the full-range value of the analogue display is 80V, and as the full range is uniformly divided into 10 grades, each grade denotes 8V; If the input is 40V, the high-lighted bar-shape will be at the position indicated by the number 5. if the input is -40V, a "-" sign will appear on the left of the analogue display.

There is no analogue displaying value when making measurement of frequency, diode, conductance and capacitance.

Full Icons Display

If the Meter is turned on with any functional button being pressed on, the LCD will display all the icons and maintain this mode until the button is released 3 seconds later.

Sleep Mode

- To preserve battery life, the Meter automatically turns off if you do not turn the rotary switch or press any button for about 30 minutes. The buzzer beeps three times 5 minutes before turning off.
- The Meter can be activated by turning the rotary switch or pressing any button.
  If the Meter is activated by turning the rotary switch, it will start from the switch selected function.
- To disable the Sleep Mode, press  while turning on the Meter.
- In MAX MIN mode, the Sleep Mode is disabled.

General Specifications

- Maximum Voltage between any Terminals and Grounding :1000V rms.
- ⚠Fused Protection for mA Input Terminal :1A,250V fast type glass fuse, ϕ5x20mm.
- ⚠Fused Protection for A Input Terminal :10A,250V fast type glass fuse, ϕ5x20mm.
- Maximum Display :8000, updates 5 times /second.
- Temperature :Operating:5°C~40°C (41°F ~104°F). Storage:-10°C~50°C (14°F~122°F).
- Relative Humidity :<80% @ 5°C - 31°C; <50% @ 31°C - 40°C.
- Altitude :Operating: 2000 m. Storage: 10000 m.
- Battery Type :One piece of 9V NEDA1604 or 6F22 or 006P.
- Battery Deficiency :Display 🔋.
- Data Holding :Display DATA HOLD.
- Negative reading :Display ▬ .
- Overloading :Display OL.
- Equipped with full icons display.
- Auto and manual range selectable.
- Dimensions (HxWxL) :195 x 90 x 39 mm.
- Weight :Approximate 550g (battery included).
- Safety/Compliances : CE Version: IEC61010 CAT III 1000V, CAT IV 600V overvoltage and double insulation standard. UL Version:UL 61010B-1, CAT II 1000V overvoltage double insulation standard.
- Certification: CE /UL

This meter is suitable for indoor use.

Accuracy Specifications (1)

Accuracy: ±(a% reading + b digits), guarantee for 1 year.
Operating temperature: 23°C±5°C.
Relative humidity: <80%.
Temperature coefficient: 0.1 x (specified accuracy) / 1°C

A. AC Voltage

Range	Resolution	Accuracy	
		50Hz~60Hz	40Hz~400Hz
800mV	100μV	±(1%+3)	±(1.5%+4)
8V	1mV		±(1.5%+3)
80V	10mV		
800V	100mV		
1000V	1V		±(2.5%+4)

Overload Protection:
AC/DC: 1000V rms
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
80mV	10μV	±(0.1%+3)	AC/DC: 1000V rms
800mV	100μV	±(0.1%+1)	
8V	1mV		
80V	10mV		
800V	100mV		
1000V	1V		

Remarks:
- **At 80mV ~ 800mV Range:**
  Input impedance ≥4000MΩ.
- **At 8V ~ 1000V Range:**
  Input impedance ≥10MΩ.

Accuracy Specifications (2)

C. Continuity, Resistance & Conductance Test

Range	Resolution	Accuracy	Overload Protection
Continuity Test (800.0Ω)	0.1Ω	Approximate ≤100 Ω	500V rms
800Ω	0.1Ω	±(0.5%+3)	
8kΩ	1Ω	±(0.5%+1)	
80kΩ	10Ω		
800kΩ	100Ω		
8MΩ	1kΩ		
80MΩ	10kΩ	±(2%+3)	
Conductance Test (80nS)	0.01nS	±(2%+10)	

Remarks:

- **Continuity Test (800.0 Ω):**
  Buzzer beeps continuously.
  Open circuit voltage approximate 0.7V.
- **At 800 Ω~ 80M ΩRange:**
  Open circuit voltage approximate 0.7V.
- **Conductance Test (80ns):**
  80nS = 12.5MΩ.

D. Capacitance

Range	Resolution	Accuracy	Overload Protection
1nF	1pF	±(3%+5)	500V rms
10nF	10pF	±(2%+3)	
100nF	100pF		
1μF	1nF		
10μF	10nF	±(3%+5)	
100μF	100nF		

Remark:
Reading under 1nF is only for reference.

E. Diodes Test

Range	Resolution	Overload Protection
Diode	1mV	500V rms

Remarks:

- Open circuit voltage approximate 3V.
- Displays approximate forward voltage drop reading.

Accuracy Specifications (3)

F. DC Current

Range	Resolution	Accuracy	Overload Protection
80mA	10μA	±(0.3%+2)	1A,250V fast type glass fuse, ϕ5x20mm.
800mA	100μA		
8A	1mA		10A,250V fast type glass fuse,ϕ5x20mm.
10A	10mA		

Remark:

- **At 8A & 10A Range:**
  For continuous measurement ≤ 10 seconds and interval time between 2 measurements greater than 15 minutes.

G. AC Current

Range	Resolution	Accuracy	Overload Protection
80mA	10μA	±(0.8%+2)	1A,250V fast type glass fuse, ϕ5x20mm.
800mA	100μA		
8A	1mA	±(1.2%+2)	10A,250V fast type glass fuse,ϕ5x20mm.
10A	10mA		

Remarks:

- **At 8A & 10A Range:**
  For continuous measurement ≤10 seconds and interval time between 2 measurements greater than 15 minutes.
- Displays effective value of sine wave (mean value response).
- Frequency response 40Hz ~ 1kHz.

Accuracy Specifications (4)

H. Frequency & Duty Cycle

Frequency - At mV ⎓ Range

Range	Resolution	Accuracy	Overload Protection
1kHz	0.01Hz	±(0.02%+1)	500V rms
10kHz	0.1Hz		
100kHz	1Hz		
1MHz	10Hz		

Remarks:

- Input sensitivity as follows:
  <100kHz: ≤100mV rms;
  ≥100kHz: ≤500mV rms;
- Maximum input amplitude: 30V rms.

Frequency - At V ~ & V⎓ Range

Range	Accuracy	Overload Protection
10Hz~100kHz	±(0.1%+3)	1000V~

Remarks:

- Input amplitude: ≥500mV rms.
- Maximum input amplitude: 30V rms.

Frequency - At A ~ & mA ~ Range

Range	Accuracy	Overload Protection
50Hz ~ 10kHz	±(0.1%+3)	1A,250V fast type glass fuse, ϕ5x20mm.
		10A,250V fast type glass fuse,ϕ5x20mm.

Remark:

- Input amplitude: ≥3000 digits.

Duty Cycle

Range	Resolution	Accuracy	Overload Protection
1% ~ 99%	0.01%	±(1%+5)	500V rms

Accuracy Specifications (5)

Remarks:

- Reading is only for reference purpose.
- **At mV⎓ 8V Range:**
  Positive pulse width ≥30μs.

Maintenance (1)

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

⚠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.
- Turn the Meter to **OFF** position 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, explosive, inflammable and strong magnetic field.

Maintenance (2)

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.

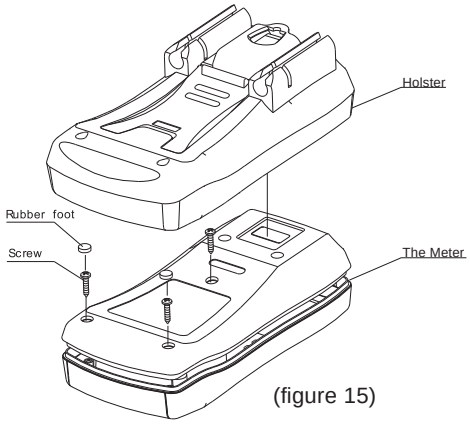
To test the fuse:

1. Set the rotary switch to •))Ω⊣⊢ and select •)) by pressing •)).
2. Plug a test lead into the terminal ⊣⊢**VΩHz** and touch the probe tip to the **10A** or **mA** 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.

Maintenance (3)

C. Replacing the Battery (see figure 15)



(figure 15)

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. Turn the Meter to **OFF** position and remove all connections from the terminals.
2. Take out the Meter from the holster.
3. Remove the 3 rubber feet and then 3 screws from the case bottom, and separate the case top from the case bottom.
4. Remove the battery from the battery connector.
5. Replace the battery with a new 9V battery (NEDA1604, 6F22 or 006P).
6. Rejoin the case bottom and case top, and reinstall the 3 screws and 3 rubber feet.

Maintenance (4)

D. Replacing the Fuses (see figure 15)

⚠Warning

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

To replace the Meter's fuse:

1. Turn the Meter to **OFF** position and remove all connections from the terminals.
2. Take out the Meter from the holster.
3. Remove the 3 rubber feet and 3 screws from the case bottom, and separate the case top from the case bottom.
4. Remove the 4 screws fixing the PCB on the input terminals, gently take apart the PCB and reverse it.
5. Remove the fuse by gently prying one end loose, then take out the fuse from its bracket.
6. Install ONLY replacement fuses with the identical type and specification as follows and make sure the fuse is fixed firmly in the bracket.
   Fuse 1:1A,250V fast type glass fuse,ϕ5x20mm.
   Fuse2: 10A,250V fast type glass fuse,ϕ5x20mm.
7. Rejoin the PCB and the case top, and reinstall the 4 screws.
8. Rejoin the case bottom and case top, and reinstall the 3 screws and 3 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	TX	Transmitting Data
4	----	4	20	DTR	Data Terminal Ready
5	----	5	7	GND	Grounding
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 9600
Start bit 1 (always 0)
Stop bit 1 (always 1)
Data bits 8
Parity Odd None

RS232C Serial Port (2)

C. System Requirements for Installing the UT70C Interface Program

To use **UT70C Interface Program**, you need the following hardware and software:

- An IBM PC or equivalent computer with 80586 or higher processor and 640 x 480 pixel or better monitor.
- Microsoft Windows 95 or above.
- At least 16 MB of RAM.
- At least 8MB free space in hard drive.
- Can access to a local or a network CD-ROM.
- A free serial port.
- A mouse or other pointing device supported by Windows.

Please refer to the included CD-ROM **"Installation Guide & Computer Interface Software"** for installing and operating instructions of the **UT70C Interface Program**.

~ END ~

This operating manual is subject to change without notice.

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