

# DL334004

# DIGITAL MULTIMETER

## Users Manual

**Read this manual thoroughly before use**

## WARRANTY

This instrument is warranted to be free from defects in material and workmanship for a period of one year. Any instrument found defective within one year from the delivery date and returned to the factory with transportation charges prepaid, will be repaired, adjusted, or replaced at no charge to the original purchaser. This warranty does not cover expandable items such as battery or fuse. If the defect has been caused by a misuse or abnormal operating condition, the repair will be billed at a nominal cost.

## INTRODUCTION

This instrument is a compact 3 3/4 digits digital multimeter designed to measure DC and AC voltage, DC and AC current, resistance, diode, continuity, transistor hFE, capacitance and frequency. It features non-contact ac voltage detection, data hold, relative measurement, backlight, and etc. It is easy to operate and is a useful test tool.

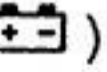
## SAFETY INFORMATION

The meter has been designed according to IEC 61010 concerning electronic measuring instruments with a measurement category (CAT II 1000V) and pollution degree 2.

### **⚠ Warning**

**To avoid possible electric shock or personal injury, follow these guidelines:**

- Do not use the meter if it is damaged. Before you use the meter, inspect the case. Pay particular attention to the insulation surrounding the connectors.
- Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads before you use the meter.
- Do not use the meter if it operates abnormally. Protection may be impaired. When in doubt, have the meter serviced.
- Do not operate the meter where explosive gas, vapor, or dust is present.
- Do not apply more than the rated voltage, as marked on the meter, between terminals or between any terminal and earth ground.
- Before use, verify the meter's operation by measuring a known voltage.
- When measuring current, turn off circuit power before connecting the meter in the circuit. Remember to place the meter in series with the circuit.
- When servicing the meter, use only specified replacement parts.

- Use caution when working with voltage above 30V ac rms, 42V peak, or 60V dc. Such voltages pose a shock hazard.
- When using the probes, keep your fingers behind the finger guards on the probes.
- When making connections, connect the common test lead before you connect the live test lead. When you disconnect test leads, disconnect the live test lead first.
- Remove the test leads from the meter before you open the battery cover or the case.
- Do not operate the meter with the battery cover or portion of the case removed or loosened.
- To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the low battery indicator (  ) appears.
- Do not use the meter if the meter or your hand is wet or if the environment is too wet.
- Do not touch any naked conductor with hand or skin.  
And do not ground yourself while using the meter.
- Adhere to local and national safety codes. Individual protective equipment must be used to prevent shock and arc blast injury where hazardous live conductors are exposed.
- Use the meter only as specified in this manual; otherwise the safety features provided by the meter may be impaired.
- Remaining endangerment:  
When an input terminal is connected to dangerous live potential, it is to be noted that this potential can occur at all other terminals!
- **CAT II** - Measurement Category II is for measurements performed on circuits directly connected to low voltage installation. ( Examples are measurements on household appliances, portable tools and similar equipments. )  
*Do not use the meter for measurements with in Measurement Categories III and IV.*

## Caution

To avoid possible damage to the meter or to the equipment under test, follow these guidelines:

- Disconnect circuit power and discharge all capacitors thoroughly before testing resistance, continuity, diode, capacitance, or transistor.
- Use the proper terminals, function and range for your measurements.
- Before current measurement, check the meter's fuses.
- Before turning the rotary switch to change function, disconnect the test leads from the circuit under test.
- Remove all test leads from the meter before connecting transistor to the meter.

## Symbols

- ~ Alternating Current
- ≡ Direct Current
- ⎓ DC or AC
- ⚠ Caution, risk of danger, refer to the operating manual before use.
- ⚡ Caution, risk of electric shock.
- ⏚ Earth (ground) Terminal
- ⏏ Fuse
- CE Conforms to European Union directives
- ⊠ The equipment is protected throughout by double insulation or reinforced insulation.

## FRONT PANEL

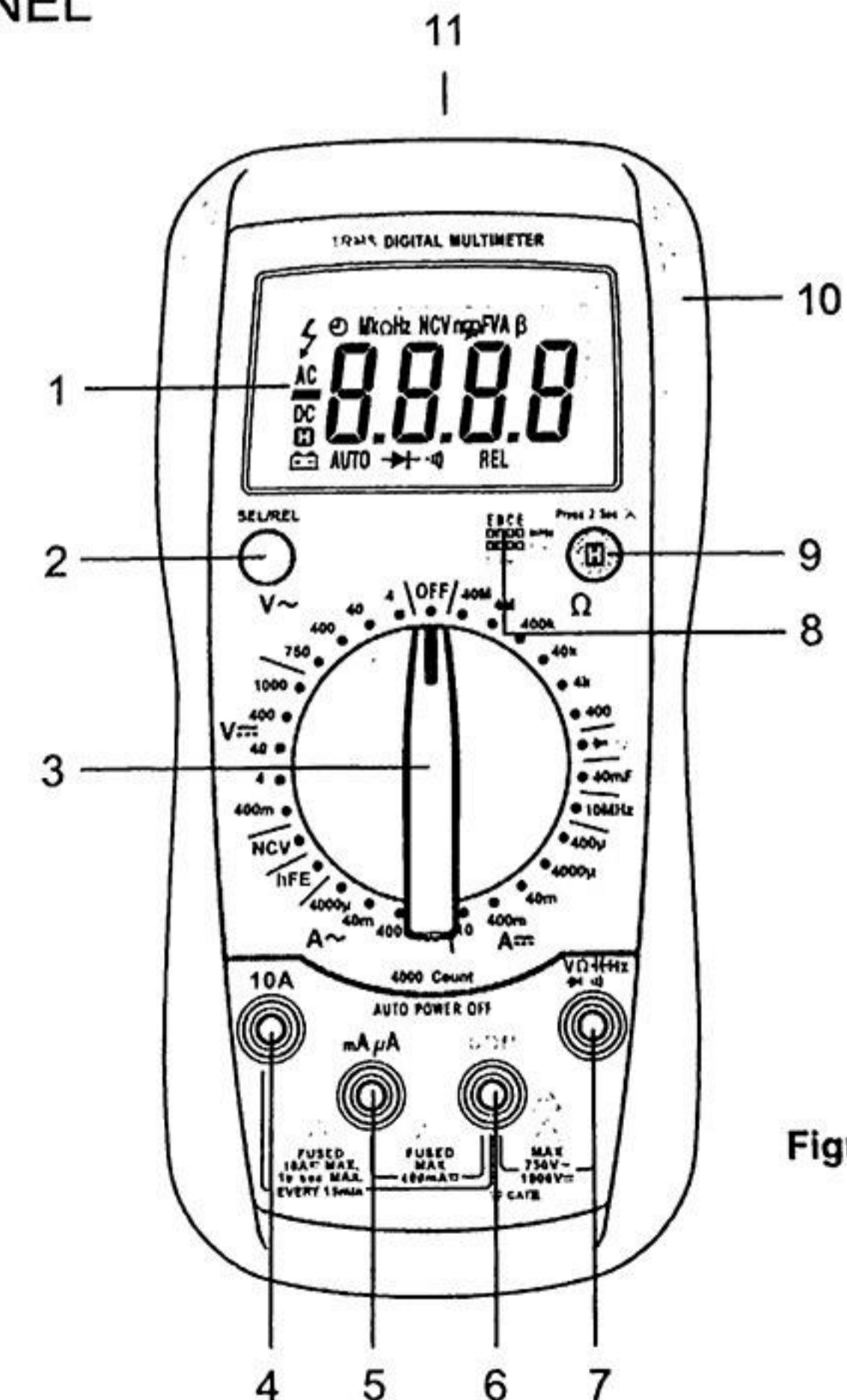


Figure 1

## 1. Display

3 3/4 digits LCD display

## 2. " SEL/REL " Button

This " SEL/REL " button can be used to switch between diode and continuity test functions.

In voltage, current, capacitance or resistance function, this button can be used to enter/exit Relative mode.

## 3. Rotary Switch

Used to select the desired function and/or range as well as to turn on or off the meter.

To save battery charge, set this rotary switch in the **OFF** position to turn off the meter when the meter is not in use.

## 4. " 10A " Terminal

Plug-in connector for the red test lead for measuring current which is between 400mA and 10A.

## 5. " mA $\mu$ A " Terminal

Plug-in connector for the red test lead for measuring current which is less than 400mA.

## 6. " COM " Terminal

Plug-in connector for the black test lead.

## 7. " $V\Omega Hz$ " Terminal

Plug-in connector for the red test lead for voltage, resistance, diode, continuity, capacitance and frequency measurements.

## 8. Transistor Test Socket

## 9. " H " Button

This " H " button can be used to enter/exit Data Hold mode.

Hold down this button for about 2 secs to turn on or off the backlight. The backlight will turn off automatically after about 30 secs.

## 10. Holster

## 11. NCV Sensor

Used in non-contact ac voltage detection.

## UNDERSTANDING THE DISPLAY

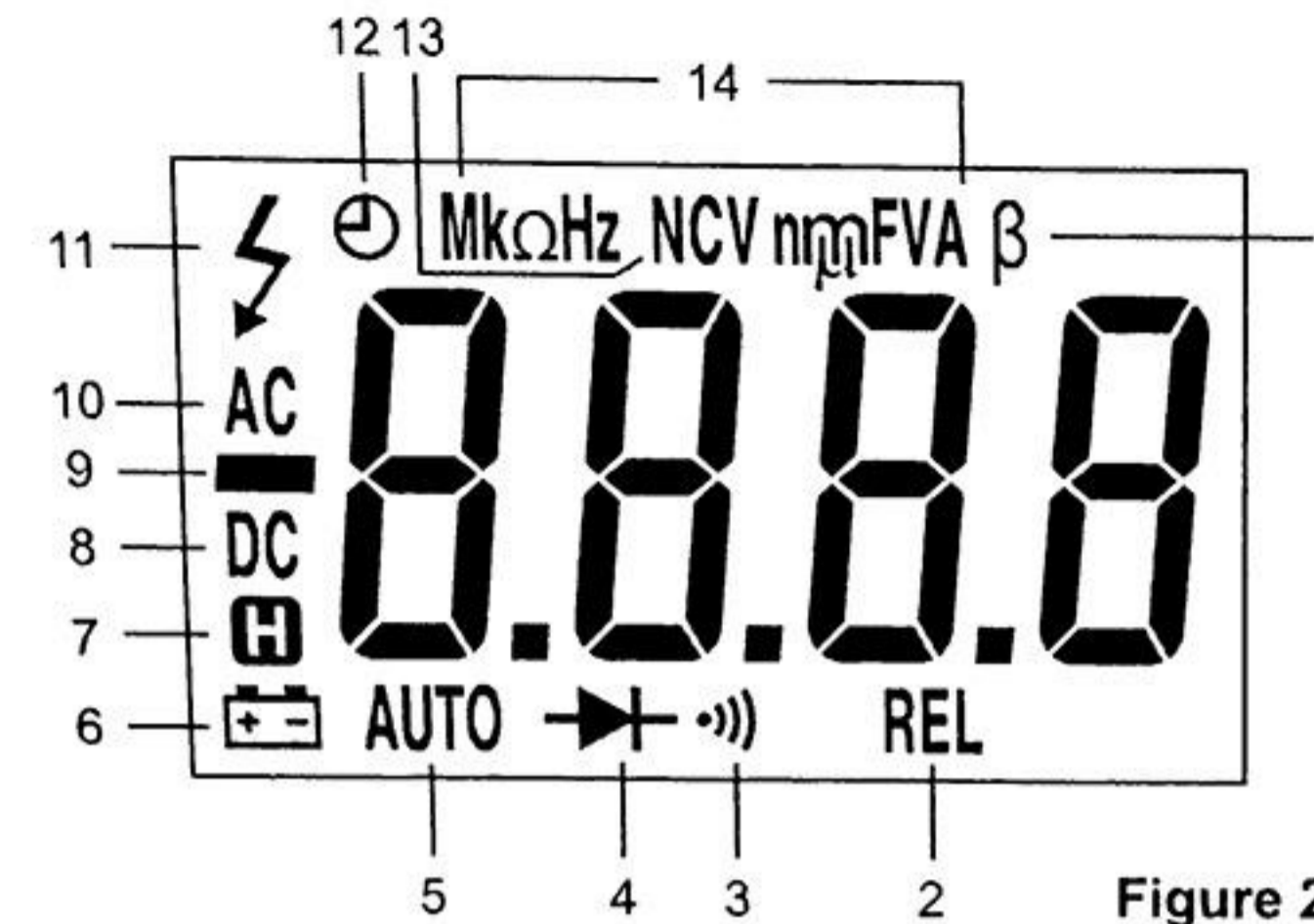


Figure 2

### Explanations:

1.  $\beta$  ..... Transistor hFE test function is selected.
2. REL ..... The meter is in Relative mode.
3.  $\cdot))$  ..... Continuity test function is selected.
4.  $\rightarrow|+$  ..... Diode test function is selected.
5. AUTO ..... Autorange mode is selected.
6.  $+ -$  ..... The battery is low and must be replaced immediately.
7. H ..... The meter is in Data Hold mode.
8. DC ..... DC
9.  $-$  ..... Negative sign
10. AC ..... AC
11.  $\text{⚡}$  ..... The absolute value of the present reading is  $\geq 30V$ . This icon is intended to remind you to use caution and avoid electric shock.
12.  $\text{⏻}$  ..... Automatic power-off feature is enabled.
13. NCV ..... The meter is in non-contact ac voltage detection function.

## 14. Units

mV, V	Unit of voltage mV: Millivolt; V: Volt; $1V = 10^3mV$
$\mu A$ , mA, A	Unit of current $\mu A$ : Microampere; mA: Milliampere; A: Ampere $1A = 10^3mA = 10^6\mu A$
$\Omega$ , k $\Omega$ , M $\Omega$	Unit of resistance $\Omega$ : Ohm; k $\Omega$ : Kilohm; M $\Omega$ : Megohm $1M\Omega = 10^3k\Omega = 10^6\Omega$
nF, $\mu F$ , mF	Unit of capacitance nF: Nanofarad; $\mu F$ : Microfarad; mF: Millifarad $1mF = 10^3\mu F = 10^6nF$
Hz, kHz, MHz	Unit of frequency Hz: Hertz; kHz: Kilohertz; MHz: Megahertz $1MHz = 10^3kHz = 10^6Hz$

## GENERAL SPECIFICATION


**Display:** 3 3/4 digits LCD, 3999 counts

**Overrange Indication:** " OL " shown on the display

**Negative Polarity Indication:** Negative sign " - " shown on the display automatically

**Sampling Rate:** About 2 to 3 times/sec

**Battery:** 9V battery, 6F22 or equivalent, 1 piece

**Low Battery Indication:** "  " shown on the display

**IP Degree:** IP20

**Operating Altitude:** 0 to 2000 meters

**Operating Environment:** Temperature: 0°C to 40°C, Relative Humidity: < 75%

**Temperature Coefficient:** 0.1 x (specified accuracy)/°C (< 18°C or > 28°C)

**Storage Environment:** Temperature: -10°C to 50°C

Relative Humidity: < 85%

**Size:** 185mm X 88mm X 62mm

**Weight:** About 393g ( including battery and holster )

## SPECIFICATION

Accuracy is specified for a period of one year after calibration and at 18°C to 28°C, with relative humidity < 75%.

Accuracy specifications take the form of :

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

### AC Voltage

Range	Resolution	Accuracy
4V	0.001V	$\pm$ (1.0% + 5)
40V	0.01V	
400V	0.1V	
750V	1V	

**Input Impedance:** About 10M $\Omega$

**Frequency Range:**

40Hz - 400Hz ( for 4V range only )

40Hz - 1kHz ( for 40V, 400V and 750V ranges only )

**Note:** Except for sine wave signal and triangular wave signal measurements, accuracy specifications for ac voltage measurements do not apply to measurements of signals whose frequencies are > 200Hz.

**Reading:** True rms

**Max. Allowable Input Voltage:** 750V

**Note:**

When the voltage being measured is  $\geq$  750V, the built-in buzzer will sound. When the voltage is > 760V, " OL " will be shown on the display.

### DC Voltage

Range	Resolution	Accuracy
400mV	0.1mV	$\pm$ (0.7% + 3)
4V	0.001V	$\pm$ (0.5% + 2)
40V	0.01V	$\pm$ (0.7% + 3)
400V	0.1V	
1000V	1V	

**Input Impedance:** About 10M $\Omega$

**Max. Allowable Input Voltage:** 1000V

Input Impedance: About 10MΩ

Max. Allowable Input Voltage: 1000V

Note:

1. In 400mV range, the display may show an unstable reading before the test leads are connected to the circuit to be tested. This is normal and will not affect measurements.
2. When the voltage being measured is  $\geq 1000V$ , the built-in buzzer will sound. When the voltage is  $> 1010V$ , " OL " will be shown on the display.

## AC Current

Range	Resolution	Accuracy
4000μA	1μA	± (1.2% + 5)
40mA	0.01mA	
400mA	0.1mA	
10A	0.01A	± (2.0% + 5)

Overload Protection:

500mA/250V Fast fuse ( for protection for " mA μA " terminal inputs )

10A/250V Fast fuse ( for protection for " 10A " terminal inputs)

Max. Allowable Input Current:

" mA μA " terminal: 400mA

" 10A " terminal: 10A ( For inputs  $> 2A$ : duration  $< 10$  secs, interval  $> 15$  minutes )

Frequency Range: 40Hz - 1kHz ( Note: Except for sine wave signal and triangular wave signal measurements, accuracy specifications for ac current measurements do not apply to measurements of signals whose frequencies are  $> 200Hz$ . )

Reading: True rms

Note:

When the current being measured is  $\geq 10A$ , the built-in buzzer will sound. When the current is  $> 10.10A$ , " OL " will be shown on the display.

## DC Current

Range	Resolution	Accuracy
400μA	0.1μA	± (1.0% + 5)
4000μA	1μA	
40mA	0.01mA	
400mA	0.1mA	
10A	0.01A	± (1.5% + 5)

Overload Protection:

500mA/250V Fast fuse ( for protection for " mA μA " terminal inputs )

10A/250V Fast fuse ( for protection for " 10A " terminal inputs)

Max. Allowable Input Current:

" mA μA " terminal: 400mA

" 10A " terminal: 10A ( For inputs  $> 2A$ : duration  $< 10$  secs, interval  $> 15$  minutes )

Note:

When the current being measured is  $\geq 10A$ , the built-in buzzer will sound. When the current is  $> 10.10A$ , " OL " will be shown on the display.

## Resistance

Range	Resolution	Accuracy
400Ω	0.1Ω	± (1.0% + 2) <sup>[1]</sup>
4kΩ	0.001kΩ	± (0.8% + 2)
40kΩ	0.01kΩ	
400kΩ	0.1kΩ	
4MΩ	0.001MΩ	± (1.2% + 2)
40MΩ	0.01MΩ	± (1.5% + 5)

[1] measured value = displayed measurement reading residual reading with the test leads shorted

## Capacitance

Range	Resolution	Accuracy
4nF	0.001nF	± (4.0% + 10)
40nF	0.01nF	
400nF	0.1nF	
4μF	0.001μF	± (3.5% + 10)
40μF	0.01μF	
400μF	0.1μF	
4mF	0.001mF	± (4.0% + 10)
40mF	0.01mF	± 10.0%

Note:

For capacitance measurements, range change is automatic.

## Transistor hFE Test

Range	hFE	Test Current	Test Voltage
PNP & NPN	0 - 1000	I <sub>b</sub> ≈ 10μA	V <sub>ce</sub> ≈ 1.6V

## Frequency


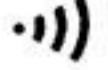
Range	Resolution	Accuracy
9.999Hz	0.001Hz	± (0.5% + 5)
99.99Hz	0.01Hz	
999.9Hz	0.1Hz	
9.999kHz	0.001kHz	
99.99kHz	0.01kHz	
999.9kHz	0.1kHz	
9.999MHz	0.001MHz	

**Required Input Voltage:** 1V rms - 20V rms

**Note:**



For frequency measurements, range change is automatic.


## Diode and Continuity Test

Range	Description	Remark
	The approximate forward voltage drop of the diode under test is displayed.	Open Circuit Voltage: about 4V
	The built-in buzzer will sound if the resistance is less than about 50Ω. The buzzer may or may not sound if the resistance is between 50Ω and 150Ω. The buzzer will not sound if the resistance is more than about 150Ω.	Open Circuit Voltage: about 2.1V

## OPERATING INSTRUCTION

### Data Hold Mode

Briefly press the "" button to enter Data Hold mode. The present reading is held on the display, and the symbol "" appears on the display as an indicator.

To exit Data Hold mode, briefly press this "" button again. The symbol "" disappears.

**Note:**

The non-contact ac voltage detection function does not have Data Hold mode.

## Using Relative Mode

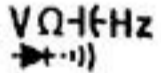
Relative mode is available in voltage, current, capacitance and resistance functions. Selecting Relative mode causes the meter to store the present reading as a reference for subsequent measurements.

1. Set the meter in desired function and/or range.
2. Connect the meter to a desired circuit ( or object ) properly to get a reading, which is to be used as a reference for subsequent measurements.
3. Briefly press the " **SEL/REL** " button once. The meter enters the Relative mode and stores the present reading as a reference for subsequent measurements.  
The symbol " **REL** " appears as an indicator and the display reads zero.  
**Note:** When the display shows " OL ", the meter can not enter the Relative mode.
4. In subsequent measurements, the display shows the difference between the reference and the new measurement.
5. To exit the Relative mode, briefly press the " **SEL/REL** " button again. The symbol " **REL** " disappears.

**Note:**

1. When the display shows " OL ", it means overrange.
2. Except for capacitance function, the actual value of the object under test must not exceed the full-scale value of the present range when the meter is in Relative mode.
3. To avoid wrong measurement result, never enter Relative mode when Data Hold mode is active.

## Measuring DC Voltage

1. Connect the black test lead to the " **COM** " terminal and the red test lead to the "" terminal.
2. Set the rotary switch in desired range position in the  $V_{\text{DC}}$  area.  
**Note:** If the magnitude of the voltage to be measured is not known beforehand, set the rotary switch to the highest range first and then reduce it range by range until satisfactory resolution is obtained.
3. Connect the test leads across the source or circuit to be tested.
4. Read the reading on the display. The polarity of the red lead connection will be indicated as well.

**Note:**

1. In low range, before the test leads are connected to the circuit to be tested, the display may show an unstable reading. This is normal and will not affect measurements.
2. When the display shows " OL ", it means overrange and you should select a higher range.
3. To avoid electric shock to you or damage to the meter, do not apply a voltage higher than 1000V dc between the terminals.
4. In any voltage measuring range, the input impedance of the meter is about 10M $\Omega$ . This load effect may cause error when measuring high resistance circuit. The error can be ignored if the impedance of the circuit being measured is  $\leq$  10k $\Omega$ .

**Measuring AC Voltage**

1. Connect the black test lead to the " COM " terminal and the red test lead to the "  $\frac{V\Omega-fHz}{\rightarrow \cdot \cdot \cdot}$  " terminal.
2. Set the rotary switch in desired range position in the  $V\sim$  area.  
**Note:** If the magnitude of the voltage to be measured is not known beforehand, set the rotary switch to the highest range first and then reduce it range by range until satisfactory resolution is obtained.
3. Connect the test leads across the source or circuit to be tested.
4. Read the reading on the display.

**Note:**

1. In low range, before the test leads are connected to the circuit to be tested, the display may show an unstable reading. This is normal and will not affect measurements.
2. When the display shows " OL ", it means overrange and you should select a higher range.
3. To avoid electric shock to you or damage to the meter, do not apply a voltage higher than 750V ac between the terminals.
4. In any voltage measuring range, the input impedance of the meter is about 10M $\Omega$ . This load effect may cause error when measuring high resistance circuit. The error can be ignored if the impedance of the circuit being measured is  $\leq$  10k $\Omega$ .

**Measuring DC Current**

1. Connect the black test lead to the " COM " terminal. If the current to be measured is less than 400mA, connect the red test lead to the " mA  $\mu$ A " terminal. If the current is between 400mA and 10A, connect the red test lead to the " 10A " terminal instead.
2. Set the rotary switch in desired range position in the  $A\overline{\text{---}}$  area.

- Note:** If the red test lead is connected to the " 10A " terminal, the rotary switch must be set in the " 10 " position ( the 10A range position ) in the  $A\overline{\text{---}}$  area.  
If the red test lead is connected to the " mA  $\mu$ A " terminal, never set the rotary switch in the " 10 " position.

3. Turn off power to the circuit to be tested. Then discharge all capacitors.
4. Break the circuit path to be tested, and connect the test leads in series with the circuit.
5. Turn on power to the circuit, then read the reading on the display. The polarity of the red test lead connection will be indicated as well.

**Measuring AC Current**

1. Connect the black test lead to the " COM " terminal. If the current to be measured is less than 400mA, connect the red test lead to the " mA  $\mu$ A " terminal. If the current is between 400mA and 10A, connect the red test lead to the " 10A " terminal instead.
2. Set the rotary switch in desired range position in the  $A\sim$  area.  
**Note:** If the red test lead is connected to the " 10A " terminal, the rotary switch must be set in the " 10 " position ( the 10A range position ) in the  $A\sim$  area.  
If the red test lead is connected to the " mA  $\mu$ A " terminal, never set the rotary switch in the " 10 " position.
3. Turn off power to the circuit to be tested. Then discharge all capacitors.
4. Break the circuit path to be tested, and connect the test leads in series with the circuit.
5. Turn on power to the circuit, then read the reading on the display.

**Measuring Resistance**

1. Connect the black test lead to the " COM " terminal and the red test lead to the "  $\frac{V\Omega-fHz}{\rightarrow \cdot \cdot \cdot}$  " terminal.
2. Set the rotary switch in desired  $\Omega$  range position.
3. Connect the test leads across the object to be tested.
4. Wait until the reading is stable, then read the reading on the display.

**Note:**

1. For measurements  $>$  1M $\Omega$ , the meter may take a few seconds to stabilize reading. This is normal for high resistance measurements.
2. When the input is not connected, i.e. at open circuit, " OL " will be displayed as an overrange indication.





## Non-Contact AC Voltage Detection

1. Set the rotary switch in **NCV** position. The display shows "EF" ( refer to Figure 3 ).
2. Move the center of the top of the meter where the NCV sensor is located ( see Figure 1 ) close to the object to be tested. When the meter detects electric field generated by ac voltage, the meter will indicate the intensity of the detected electric field. The intensity of detected electric field is indicated by the number of the bar segments at the vertical center of the display ( refer to Figure 4 ) and the beeping rate of the built-in buzzer. The higher the intensity of detected electric field, the larger the number of the bar segments on the display, and the faster the beeping rate of the buzzer.

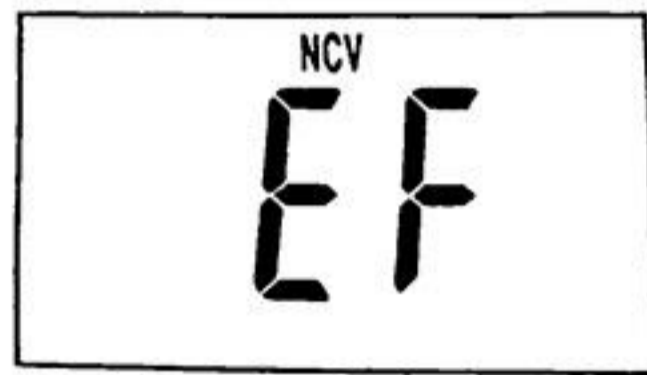


Figure 3

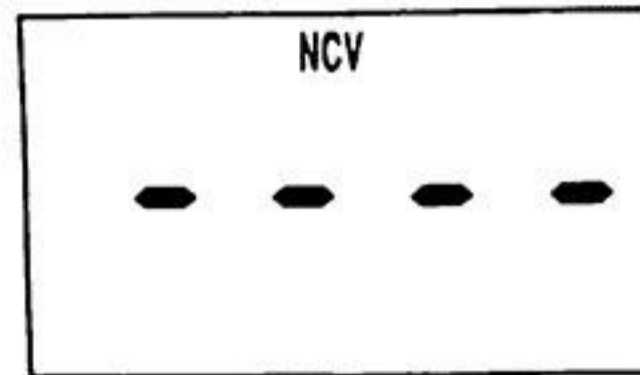


Figure 4

### Note:

1. Detection Range: 90V - 1000V  
Frequency Response: 50Hz/60Hz
2. The meter's electric field intensity indication is affected by the magnitude of the ac voltage of the conductor under test, the distance between the meter and the conductor, the insulation of the conductor, and etc.
3. Because of the meter's detection limit, a line ( or conductor) under test may be electrically live even if the meter does not indicate presence of electric field.
4. Before use, verify the meter's operation by detecting a known AC voltage.  
Do not use the meter if it operates abnormally or malfunctions.
5. To avoid electric shock, do not touch any conductor with hand or skin.

## Automatic Power-Off

The meter will turn off automatically and go into Sleep mode if you have not operated the meter for about 15 minutes. To arouse the meter from Sleep, just press a button or turn the rotary switch.

To disable the automatic power-off feature, turn the rotary switch from the " OFF " position to other switch setting while holding down the " SEL/REL " button; the symbol " Ⓢ " will be absent from the display.

## Additional Remarks

After the meter is turned on, the display shows all segments briefly and then the meter goes into normal measurement state.

When you press a button, the meter will sound a beep if this press is effective.

The meter will sound several short beeps about one minute before the meter turns off automatically and will sound a long beep before the meter turns off automatically.

## MAINTENANCE

### Warning

Except replacing fuse and battery, never attempt to repair or service the meter.

Store the meter in a dry place when not in use. Don't store it in an environment with intense electromagnetic field.

### General Maintenance

Periodically wipe the case with a damp cloth. Do not use abrasive or solvent.


Dirt or moisture in the terminals can affect readings. Clean the terminals as follows:

1. Turn off the meter and remove all the test leads from the meter.
2. Shake out any dirt which may exist in the terminals.
3. Soak a new swab with alcohol.
4. Work the swab around in each terminal.

If the meter does not seem to work properly, check and replace ( as needed ) the battery and fuses and/or review this manual to verify correct operation.


## Replacing the Battery and Fuse

### Warning

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

To prevent damage, electric shock or personal injury, install only replacement fuses specified.

Turn off the meter and remove the test leads before opening the battery cover or the case.

When the low battery indicator (  ) appears on the display, the battery is low and must be replaced immediately. To replace the battery, remove the holster from the meter. Then remove the screws on the battery cover and remove the battery cover. Replace the exhausted battery with a new one of the same type.

Reinstall the battery cover, the screws and the holster.

To replace the fuse, remove the holster from the meter.

Then remove the screws on the back cover and move the back cover aside gently. Replace the blown fuse with a new one of the same ratings. Reinstall the back cover, the screws and the holster.

This meter uses two fuses:

**F1:** Fuse, 500mA/250V, Fast action, Ø5X20mm

**F2:** Fuse, 10A/250V, Fast action, Ø5X20mm

## ACCESSORIES

**Manual:** 1 piece

**Test Lead:** 1 pair

## NOTE

1. This manual is subject to change without notice.
2. Our company will not take the other responsibilities for any loss.
3. The contents of this manual can not be used as the reason to use the meter for any special application.

### DISPOSAL OF THIS ARTICLE

Dear Customer,

If you at some point intend to dispose of this article, then please keep in mind that many of its components consist of valuable materials, which can be recycled.

Please do not discharge it in the garbage bin, but check with your local council for recycling facilities in your area.

