

# 3 3/4 Digits Auto Range DMM with Capacitance and Frequency OPERATION MANUAL

## 1. SAFETY RULES

- This meter is designed and tested in accordance with EN publication 61010-1, pollution degree II and installation category (overvoltage category) III 600V.
- This meter has been tested according to the following EC Directives
  - 89/336/EEC Electromagnetic Compatibility, EN61326
  - 73/23/EEC Product safety law of Low Voltage Directive, EN61010-1
- This meter is designed to be indoor use at temperature 5°C to 40°C and altitude up to 2,000m.
- To ensure that the meter is used safely, follow all safety and operating instructions in this operation manual. If the meter is not used as described in this operation manual, the safety features of this meter might be impaired.

## 2. INTERNATIONAL SYMBOLS

- |  |                                  |  |                   |
|--|----------------------------------|--|-------------------|
|  | Important information see manual |  | Diode             |
|  | AC                               |  | Continuity        |
|  | DC                               |  | Ground            |
|  |                                  |  | Double insulation |

## 3. SPECIFICATIONS

### 3.1 General Specifications

- Display : 3 3/4 digit LCD with max. reading of 3999.  
 Polarity : Automatic, (-) negative polarity indication.  
 Zero adjustment : Automatic.  
 Over range indication : Only the MSD "OL" is displayed.  
 Power : 9V NEDA 1604, JIS 006P, IEC6F22 battery x 1  
 Dimension : 194(L) x 93(W) x 39.4(H)mm.  
 Net Weight : Approx. 400g. (Including battery).

### 3.2 Electrical Specifications

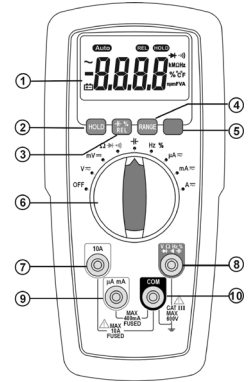
Accuracies are ± (% of reading + number of least significant digits) at 23°C ± 5°C, <75% RH.

DC Voltage	Range	Resolution	Accuracy	Input Impedance	Overload Protection	
	400mV	0.1mV	±(1.0%+2)			10MΩ
4V	0.001V	±(0.8%+1)				
40V	0.01V					
400V	0.1V					
600V	1V					
DC Milli-Voltage	400mV	0.1mV	±(1.0%+2)	10MΩ	600V DC/AC rms (< 30 sec.)	
AC Voltage	Range	Resolution	Accuracy	Freq. Range	Input Impedance	Overload Protection
	400mV*	0.1mV	±(2.0%+5d)	40~400Hz	10MΩ	600V DC/AC rms (< 30 sec.)
	4V	0.001V	±(1.2%+3d)			
	40V	0.01V				
	400V	0.1V				
600V	1V					
DC Current	Range	Resolution	Accuracy	Voltage Drop	Overload Protection	
	400uA	0.1uA	±(1.0% + 5d)	400mV	Fuse 500mA/600V	
	4000uA	1uA				
	40mA	0.01mA				
	400mA	0.1mA				
4A	0.001A	±(1.2% + 5d)				400mV
10A	0.01A	±(1.5% + 5d)	200mV	Fuse 10A/600V		
AC Current	Range	Resolution	Accuracy	Voltage Drop	Freq. Range	Overload Protection
	400uA	0.1uA	±(1.2% + 5d)	400mV	40-400Hz	Fuse 500mA/600V
	4000uA	1uA				
	40mA	0.01mA				
	400mA	0.1mA				
4A	0.001A	±(1.5% + 5d)				
10A	0.01A	±(2.0% + 5d)	200mV	40-400Hz	Fuse 10A/600V	
Resistance	Range	Resolution	Accuracy	Open circuit voltage	Overload Protection	
	400Ω	0.1Ω	±(1.0%+2d)	<700mV	600V DC/AC rms (< 30 sec.)	
	4 kΩ	0.001 kΩ				
	40 kΩ	0.01 kΩ				
	400 kΩ	0.1 kΩ				
	4 MΩ	0.001 MΩ				
30 MΩ	0.01 MΩ	±(2.0%+5d)				
Diode Test	Forward Volt. Drop	Test Current	Open circuit voltage	Overload Protection		
	0-1.000V	Approx. 0.6mA	Max. 1.5V	600V DC/AC rms (< 30 sec.)		
Continuity Test	Test range	Test Current	Open circuit Voltage	Overload Protection		
	Buzzer sounds when resistance value ≤ 50Ω	Approx. 1mA	Approx. 0.5V	600V DC/AC rms (< 30 sec.)		
Capacitance	Range	Resolution	Accuracy	Overload Protection		
	50.00nF	0.01nF	±(3.0%+5d)	600V DC/AC rms (< 30 sec.)		
	500.0nF	0.1nF				
	5.000uF	0.001uF				
	50.00uF	0.01uF				
100uF	0.1uF(15sec)	±(3.5%+5d)				
Frequency	Range	Resolution	Accuracy	Overload protection		
	5Hz	0.001Hz	±(1.5% + 5d) Vpp = 600mV	600V DC/AC rms (< 30 sec.)		
	50Hz	0.01Hz				
	500Hz	0.1Hz				
	5kHz	1Hz				
	50kHz	10Hz				
100kHz	100Hz					

\*ACmV only available in manual-range

## 4. PANEL DESCRIPTIONS

- LCD display
- HOLD key
- Multifunction key
- RANGE key
- Yellow key
- Multifunction Selector
- Current input terminal (10A)
- Input terminal
- Current input terminal (uA, mA)
- Common input terminal



## 5. OPERATION

### ⚠ WARNING

- When measuring voltage ensure that the instrument is not connected or switched to a current, resistance, frequency, duty cycle, capacitance or diode/ continuity check range. Always ensure that the correct terminals are used for the type of measurement to be made.
- Use extreme care when measuring voltage above 50V, especially from sources where high energy exists.
- Avoid making connections to "live" circuits whenever possible.
- Before performing resistance, capacitance, diode or continuity test, ensure that the circuit under test is de-energised.
- Always ensure that the correct function and range is selected. If in doubt about the correct range, start with the highest and work downwards.
- Extreme care should be taken when using the instrument to conjunction with a current transformer connected to the terminals. High voltage may be produced at the terminals if an open circuit occurs.
- Ensure that the test leads and prods are in good condition with no damage to the insulation.
- Take care not to exceed the overload limits as given in the specifications.

### 5.1 DC and AC voltage measurement

- Connect the black test lead to the "COM" terminal and red test lead to the  $\text{V} \Omega \text{Hz} \%$  terminal.
- Set the multifunction selector to  $\text{V}$  position and connect the test leads across the source or load under measurement.
- Using the yellow key to select AC voltage mode. The icon " $\sim$ " must be shown on the display.
- Connect the test leads across the source or load under measurement.

### 5.2 DC milli-voltage measurement

- Connect the black test lead to the "COM" terminal and red test lead to the  $\text{V} \Omega \text{Hz} \%$  terminal.
- Set the multifunction selector to  $\text{mV}$  position and connect the test leads across the source or load under measurement.
- Connect the test leads across the source or load under measurement.

### 5.3 DC and AC current measurement

- Connect the black test lead to the "COM" terminal and red test lead to the  $\mu\text{A mA}$  terminal for measurement up to 400mA.
- Set the multifunction selector to desired current range position.
- Connect the test leads in series with the current source to be measured.
- Using the yellow key to select AC current mode. The icon " $\sim$ " must be shown on the display.
- For current measurement from 400mA to 10A (fused) follow generally the above procedure but connect the red test lead to "10A" terminal.

⚠ CAUTION: Max. input over-load: 600V rms < 10sec.

### 5.4 Resistance measurement

- Connect the black test lead to the "COM" terminal and red test lead to the  $\text{V} \Omega \text{Hz} \%$  terminal.
  - Set the multifunction selector to  $\Omega$  position.
  - Connect the test leads across the circuit to be tested.
- ⚠ CAUTION: Ensure that the circuit to be tested is "dead".  
Max. input overload: 600V rms < 30sec.

### 5.5 Diode test

- Connect the black test lead to the "COM" terminal and red test lead to the  $\text{V} \Omega \text{Hz} \%$  terminal.
  - Set the multifunction selector to  $\rightarrow$  position.
  - Using the yellow key select a  $\rightarrow$  function. The icon " $\rightarrow$ " must be shown on the display.
  - Push on the meter and connect the black and red test leads to the cathode (-) and anode (+) ends of the diode to be tested respectively.
  - Read the forward voltage drop (junction) value from the display. When the forward biased is open, the display will shows overload 'OL'.
- ⚠ CAUTION: Max. input overload: 600V rms < 30sec.

### 5.6 Continuity test

- Connect the black test lead to the "COM" terminal and red test lead to the  $\text{V} \Omega \text{Hz} \%$  terminal.
  - Set the multifunction selector to  $\Omega \rightarrow$  position.
  - Using the select key select a  $\rightarrow$  function. The icon " $\rightarrow$ " must be shown on the display.
  - Connect the test leads across the circuit to be tested, if the resistance less than 50Ω, buzzer will be activated.
- ⚠ CAUTION: Max. input overload: 600V rms < 30sec.

### 5.7 Frequency measurement

- Connect the black test lead to the "COM" terminal and red test lead to the  $\text{V} \Omega \text{Hz} \%$  terminal.
- Set the multifunction selector to  $\text{Hz} \%$  position




3. Connect the test leads across the source under measurement.

CAUTION: Max. input over-load : 600V rms < 30sec.


#### 5.8 Capacitance measurement

1. Connect the black test lead to the "COM" terminal and red test lead to the " $\frac{V\Omega Hz}{\text{---} \text{---} \text{---}}$ " terminal.
2. Set the multifunction selector to  $\text{---} \text{---} \text{---}$  position.
3. When the reading does not display zero value, you can manually set the zero by pressing multifunction key.
4. Connect the black and red test probes to the cathode (-) and anode (+) ends of the capacitor to be tested respectively.

 CAUTION: Ensure that the capacitor to be tested is "de-energized".  
Max. input over-load : 600V rms < 30sec.

#### 5.9 Duty Cycle measurement

1. Connect the black test lead to the "COM" socket and red test lead to the " $\frac{V\Omega Hz}{\text{---} \text{---} \text{---}}$ " socket.
2. Set the function selector to **Hz %** position.
3. Using the multifunction key select a % function. The icon "%" must be shown on the display.
4. Connect the test leads into the points of the circuit under test; the duty cycle ratio will be displayed.

 CAUTION: Max. input over-load : 600V rms < 30sec.

#### 5.10 Auto power off

Automatic POWER OFF extends the life of the battery by turning the meter off automatically if no rotary function switch is operated for about 45minutes. The power will be resumed by pressing the HOLD key.

#### 5.11 Data hold

The HOLD key is used to hold data during measurement and to switches ON and OFF the display back light. Press the key once, reading will be held. Re-press the key reading will resume active.

#### 5.12 Manual range select

The RANGE key is used to select the auto ranging mode or manual ranging mode (except DC mV, frequency, duty cycle and capacitance measurement). By pressing this key, the instrument will go to manual ranging mode, the symbol "Auto" on the display will be disappear. Press the key to select the desired range. Pressing the key more than 1 second, the instrument will be going back to auto ranging mode.

## 6. MAINTENANCE

### CAUTION

BEFORE ATTEMPTING BATTERY REMOVAL OR REPLACEMENT, DISCONNECT TEST LEADS OR PROBES FROM ANY ENERGISED CIRCUITS TO AVOID SHOCK HAZARD.

#### 6.1 Fitting and replacing the battery

1. Ensure that the instrument is not connected to any external circuit, push the selector to OFF position and remove the test leads from the terminals.
2. Remove four screws of the back case.
3. Replace the spent battery with the same type and rating.
4. Reinstall the back case, tighten and securing screw.

#### 6.2 Cleaning

Periodically wipe the case with a soft damp cloth and mild household cleanser. Do not use abrasives or solvents. Ensure that no water gets inside the equipment to prevent possible shorts and damage.

## 7. ACCESSORIES

The accessories contained inside the packaging are the following:

<ul style="list-style-type: none"> <li>• Pair of test leads – P-B</li> <li>• Instruction manual</li> <li>• Carrying Case</li> </ul>	<ul style="list-style-type: none"> <li>• Single, standard 9 volt battery NEDA 1604, JIS 006P, IEC6F22.</li> </ul>
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## 8. SERVICE

### 8.1 Warranty Conditions

This meter is guaranteed against any material fault or manufacturer's defect, in accordance with the general conditions of sale. During the warranty period (one year), faulty parts may be replaced, with the manufacturer reserving the right to decide either to repair or replace the product.

In the event of returning the meter to the after-sales service or to a regional branch, the outward transport is payable by the customer. The delivery must be agreed in advance with consignee.

For delivery indicate, by means of an enclosed note, as clear as possible, the reasons for returning it. Use only the original packing.

Any damage caused by shipment using NOT the original packaging will be charged in any case to the consignor.

The manufacturer will not be responsible for any damage to persons or things.

The warranty does not apply to the following cases:

- Accessories and battery are not included in warranty.
- Repairs following unsuitable use of the meter or by combining the latter with incompatible meter or accessories.
- Repairs resulting from incorrect shipping.
- Repairs resulting from servicing carried out by a person not approved by the company.
- Modifications to the meter without explicit authorisation from our technical department.
- Adaptation to a particular application not provided for by the definition of the meter or by the instruction manual.

The contents of this manual may not be reproduced in any form whatsoever without the manufacturer's authorization.

**Our products are patented. The logotypes are registered. We reserve the right to modify specifications and prices as part of technological developments which might be necessary.**

### 8.2 Service

If the meter should not work properly, before contacting the DEALER OR THE SERVICE CENTRE, check the battery condition, the test leads, etc., Change them if necessary.

If the meter still does not work, check if your operating procedure agrees with the description in this manual.

In the event of returning the meter, it must be re-sent to the after-sales service (at address or to a regional branch), the outward transport is payable by the customer. The delivery must be agreed in advance with consignee.

For delivery indicate the reasons for returning it. (By means of an enclosed note, as clear as possible). Use only the original packing.

Any damage caused by delivery with NO original packaging will be charged in any case to the consignor.

**FOR TECHNICAL ASSISTANCE,  
PLEASE CONTACT:**

**Remarks: Due to our policy of continual product development, we reserve the right to amend the specifications of the mentioned products without notice.**

CM5092 (short form)  
REV1JUL.07