

# OPERATOR'S MANUAL

## CAUTION:

\* Before attempting to insert transistors capacitor thermocouple for testing, always be sure that test test leads have been disconnected from any measurement circuits.

\* Components should not be connected to the hFE and capacitor and the thermocouple socket when making voltage measure with test leads.

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

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## 1. SAFETY INFORMATIONS

This multimeter has been designed according to IEC-1010 concerning electronic measuring instruments with an overvoltage category (CAT II) and pollution 2.

Follow all safety and operating instructions to ensure that meter is used safely and is kept in good operating condition.

### 1.1 PRELIMINARY

\* When using this meter, the user must observe all normal safety rules concerning:

- Protection against dangers of electronic current.
- Protection of the meter against misuse.

\* Full compliance with safety standards can be guaranteed only if used with test leads supplied. If necessary, they must be replaced with the same model or same electronic ratings. Measuring leads must be in good condition.

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### 1.2 DURING USE

\* Never exceed the protection limit values indicated in specifications for each range of measurement.

\* When the meter is linked to measurement circuit, do not touch unused terminals.

\* When the value scale to be measured is unknown beforehand, set the range selector at the highest position.

\* Before rotating the range selector to change functions, disconnect test leads from the circuit under test.

\* When carrying out measurements on TV or switching power circuits, always remember that there may be high amplitude voltage pulses at test points which can damage the meter.

\* Never perform resistance measurements on live circuits.

\* Always be careful when working with voltage above 60V dc or 30V ac rms. Keep fingers behind the probe barriers while measuring.

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### 1.3 SYMBOLS

△ Important safety information, refer to the operating manual.

△ Dangerous voltage may be present.

⊥ Earth ground

□ Double insulation (protection class II)

#### △ WARNING

\* Before attempting to insert transistors for testing, always be sure that test leads have been disconnected from any measurement circuits.

\* Components should not be connected to the hFE and capacitor socket and the thermocouple has been removed when making voltage measurements with test leads.

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## 1.4 MAINTENANCE

\* Before opening the meter, always disconnect test leads from all sources of electric current.

\* For continue protection against fire, replace fuse only with the specified and current rating:

F1: F2A / 250V      F2: F 10A/250V

\*If any faults or abnormalities are observed, the meter can not be used any more and it has to be checked out.

\*Never use the meter unless the back cover is in place and fastened fully.

\*To clean the meter, use a damp cloth and mild detergent only, do not use abrasives or solvents on it.

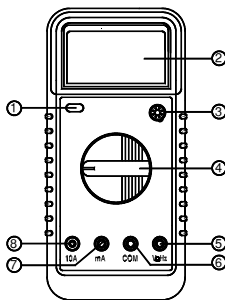
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## 2. DESCRIPTION

This meter is a portable professional measuring instrument with 3 1/2 digit LCD, capable of performing functions:

- DC voltage measurement, 5 ranges from 200mV to 1000V
- AC voltage measurement, 5 ranges from 200mV to 700V
- DC current measurement, 7 ranges from 20  $\mu$  A to 10A
- AC current measurement, 6 ranges from 200  $\mu$  A to 10A
- Resistance measurement, 7 ranges from 200  $\Omega$  to 200M  $\Omega$
- Diode test
- Transistor test
- Audible continuity test

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1. Power Switch
2. LCD Display
3. Transistor Testing Socket
4. Rotary Switch
5. V/ $\Omega$  Input Jacks
6. COM Input Jack
7. A Input Jack
8. 10A Input Jack

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## 2.1 FUNCTION AND RANGE SELECTOR

There are 8 functions and 32 ranges provided. A rotary switch is used to select functions as well as ranges.

## 2.2 POWER SWITCH


A push-push switch is used to turn the meter on or off.

To extend the battery life, Auto Power- Off function is provided (Optional). The meter will be turned off automatically within around 40 minutes. To turn on the meter again, push the power switch to release it and then push it once more.

## 2.3 INPUT JACKS

This meter has four input jacks that are protected against overload to the limits shown. During use connect the black test lead to COM jack and the red test lead as shown below:

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Function	Red Lead Connection	Input Limits
200mV $\equiv$	V / $\Omega$	250V dc or rms ac
V $\equiv$ & V $\sim$	V / $\Omega$	1000V dc, 700V ac (sine)
$\Omega$	V / $\Omega$	250V dc or rms ac
 $\rightarrow$	V / $\Omega$	250V dc or rms ac
A $\equiv$ & A $\sim$	A	2A dc or rms ac
10A	10A	10Adc or rms ac

Current range are protected by fuses

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## 3. OPERATING INSTRUCTION

### 3.1 MEASURING VOLTAGE

1. Connect the black lead to the COM jack and the red test lead to the V /  $\Omega$  jack.
2. Set the rotary switch at the desired V  $\equiv$  or V $\sim$  range position and connect test leads across the source or load under measurement.
3. Read LCD display. The polarity of the red lead connection will be indicated when making a dc measurement.
4. When only the figure "1" is displayed, it indicates overrange situation and the higher range have to be selected.

### 3.2 MEASURING CURRENT

1. Connect the black lead to the COM jack and the red test lead to the A jack for a maximum of 2A. For a max of 10A, move the red lead to the A jack.

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2. Set the rotary switch at desired A $\overline{=}$  or A $\sim$  range position and connect test leads in series with the load under measurement.
3. Read LCD display. The polarity of the red lead connection will be indicated when making a DC measurement.
4. When only the figure "1" displayed, it indicates overrange situation and the higher range has to be selected.

### 3.3 MEASURING RESISTANCE

1. Connect the black test lead to the COM jack and the red to the V/ $\Omega$  jack. (NOTE: The polarity of red lead connection is positive "+" )
2. Set the rotary switch at desired  $\Omega$  position and connect test leads across the resistor under measurement. Read LCD display.

Note:

1. For resistance above 1M $\Omega$ , the meter may take a few seconds to get stable reading.

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2. When the input is not connected, i.e. at open circuit, the figure "1" will be displayed for the overrange condition.
3. When checking in – circuit resistance, be sure the circuit under test has all power removed and that all capacitors are fully discharged.
4. At 200M $\Omega$  range display reading is around 10 counts when test leads are Shorted. These counts have to be subtracted from measuring results. For example, when measuring 100M $\Omega$  resistance the display reading will be 101.0 and the correct measuring result should be 101.0-1.0=100.0M $\Omega$ .

### 3.4 TESTING DIODE

1. Connect the black test lead to COM jack and the red test lead to the V $\Omega$  jack ( NOTE: The polarity of red lead connection is positive "+" )
2. Set the rotary switch at  $\rightarrow$  position and connect the red lead to the anode, the black lead to the cathode of the diode under testing .The meter will show the approx. forward voltage of the diode. If the lead connection is reversed. only figure "1" will be displayed.

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### 3.5 TESTING TRANSISTOR

1. Set the rotary switch at hFE position.
2. Determine whether the transistor is NPN or PNP type and locate the Emitter. Base and Collectors. Insert leads of the transistor into proper holes of the testing socket or the front panel.
3. LCD display will show the approximate hFE value at the test condition of base current 10  $\mu$  A and Vce 3.2V.

#### $\triangle$ WARNING

Before attempting to insert transistors for testing, always be sure that test leads have been disconnected from any measurement circuits. Components should not be connected to the hFE socket when making voltage measurements with test leads.


### 3.6 CONTINUITY TEST

1. Connect the black test lead to the COM jack and the red test lead to the V/ $\Omega$  jack
2. Set the rotary switch at  $\mathbb{J}$  position and connect test leads across two points of the circuit under testing. If continuity exists (i.e., resistance less than about 70  $\Omega$ ), built - in buzzer will sound.

#### 4. SPECIFICATIONS

Accuracy is specified for a period of one year after calibration and at 18°C to 28°C (64°F to 82°F) with relative humidity to 80%.

##### 4.1 GENERAL

Maximum Voltage between Terminals	1000V dc or 700V rms ac (sine)
And Earth Ground	
Fuse Protection	A: F 2A/250V 10A: F 10A/250V
Power Supply	9V battery, Neda 1604 or 6F22
Display	LCD, 1999 counts max., updates 2-3/sec
Measuring Method	Dual-slope integration A/D converter
Overrange Indication	"1" display only
Polarity Indication	"-" displayed for automatically
Low Battery Indication	"  " appears on the display
Operating Temperature	0°C to 40°C (32°F to 104°F)

Storage Temperature	-10°C to 50°C (10°F to 122°F)
Size (Hxwxl)	91mm × 189mm × 31.5mm
Weight	310g (including battery)

##### 4.2 DC VOLTAGE

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

Input impedance: 10M Ω

##### 4.3 AC VOLTAGE

Range	Resolution	Accuracy
200mV	0.1mv	±1.2% of rdg ± 3 digits
2V	1mV	±0.8% of rdg ± 3 digits
20V	10mV	±0.8% of rdg ± 3 digits
200V	0.1V	±0.8% of rdg ± 3 digits
700V	1V	±1.2% of rdg ± 3 digits

Input impedance: 10M Ω

Frequency Range: 40Hz to 400Hz

Response: Average, calibrated in rms of sine wave

#### 4.4 DC CURRENT

Range	Resolution	Accuracy	Burden Voltage
20 $\mu$ A	0.01 $\mu$ A	$\pm 2.0\%$ of rdg $\pm 5$ digits	10mV/ $\mu$ A
200 $\mu$ A	0.1 $\mu$ A	$\pm 0.8\%$ of rdg $\pm 1$ digit	1.0mV/ $\mu$ A
2mA	1 $\mu$ A	$\pm 0.8\%$ of rdg $\pm 1$ digit	100mV/mA
20mA	10 $\mu$ A	$\pm 0.8\%$ of rdg $\pm 1$ digit	11mV/mA
200mA	0.1mA	$\pm 1.5\%$ of rdg $\pm 1$ digit	2.0mV/mA
2A	2A	$\pm 1.5\%$ of rdg $\pm 1$ digit	0.4V/A
10A	10mA	$\pm 2.0\%$ of rdg $\pm 5$ digit	0.03V/A

Overload Protection: F 2A fuse for 20  $\mu$  A to 2A ranges, F 10A fuse for 10A range.

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#### 4.5 AC CURRENT

Range	Resolution	Accuracy	Burden Voltage
200 $\mu$ A	0.1 $\mu$ A	$\pm 1.8\%$ of rdg $\pm 3$ digits	1.0mV/ $\mu$ A
2mA	1 $\mu$ A	$\pm 1.0\%$ of rdg $\pm 3$ digits	100mV/mA
20mA	10 $\mu$ A	$\pm 1.0\%$ of rdg $\pm 3$ digits	11mV/mA
200mA	0.1mA	$\pm 1.8\%$ of rdg $\pm 3$ digits	2.0mV/mA
2A	1mA	$\pm 1.8\%$ of rdg $\pm 3$ digits	0.4V/A
10A	10mA	$\pm 3.0\%$ of rdg $\pm 7$ digits	0.03V/A

Overload Protection: F 2A fuse for 20  $\mu$  A to 2A ranges, F 10A fuse for 10A range.

Frequency Range: 40Hz to 400Hz

Response: Average, Calibrated in rms of sine wave

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#### 4.6 RESISTANCE

Range	Resolution	Accuracy
200 $\Omega$	0.1 $\Omega$	$\pm 0.8\%$ of rdg $\pm 3$ digits
2K $\Omega$	1 $\Omega$	$\pm 0.8\%$ of rdg $\pm 1$ digit
20K $\Omega$	10 $\Omega$	$\pm 0.8\%$ of rdg $\pm 1$ digit
200K $\Omega$	100 $\Omega$	$\pm 0.8\%$ of rdg $\pm 1$ digit
2M $\Omega$	1K $\Omega$	$\pm 0.8\%$ of rdg $\pm 1$ digit
20M $\Omega$	10K $\Omega$	$\pm 1.0\%$ of rdg $\pm 1$ digit
200M $\Omega$	100K $\Omega$	$\pm 5.0\%$ of (rdg - 10 digits) $\pm 10$ digits

Note: On 200M  $\Omega$  range, if short input, display will read 1 M  $\Omega$ , this 1M  $\Omega$  should be subtracted from measurement results.

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#### 4.7 DIODE

Range	Description	Test Condition
▶	Shows the approximate forward voltage drop	Forward Current 1mA Vce 3.2V

#### 4.8 CONTINUITY

Range	Description
♫	Built-in buzzer will sound, if the resistance under test is less than about 70 $\Omega$

## 5. ACCESSORIES

### 5.1 SUPPLIED WITH THE MUL TIMETER

Test leads	Electric Rating 1000V,	10A MASTECH HYTL- 60
Battery	9V NEDA 1604 or 6F22	
Operating Manual		HYS004240
Holster		HYHT-60

### 5.2 How to use the holster


The holster is used to protect the meter and to make the measurement more comfortable.

It comes with two stands installed together. The figure shows how to use the holster to:

- Support the meter with a standard angle.
- Support the meter with a small angle using the little stand
- Hang the meter on the wall using the little stand. Take the little stand off from the back side of the large stand and insert it into holes located upper on the holster.
- Hold test leads.

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## 6. BATTERY & FUSE REPLACEMENT

If the sign”  ”appears on the LCD display, it indicates that battery should be replaced. Remove screws on the back cover and open the case. Replace the exhausted battery with a new one.

Fuse rarely need replacement and blow almost always as a result of the operator’s error. Open the case as mentioned above, and then take the PCB out from the front cover. Replace the blown fuse with same ratings.

### ⚠WARNING

Before attempting to open the case, be sure that test leads have been disconnected from measurement circuits to avoid electric shock hazard.

For protection against fire, replace fuse only with specified ratings:

F1: F 2A/250V      F2: F 10A/250V

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