

# DIGITAL MULTIMETER

## Users Manual

### Table of Contents

- 1. Introduction**
- 2. Safety note**
- 3. Explanation of Controls and Indicators**
  - 3-1. Product illustration
  - 3-2. Functional push button
  - 3-3. LCD display
- 4. Specification**
  - 4-1. General Specification
  - 4-1. Electrical Specification
- 5. Measurement operation**
  - 5-1 DC voltage & AC voltage measurement
  - 5-2. Resistance measurement
  - 5-3. Diode & Continuity check
  - 5-4. Frequency Measurement
  - 5-5. DC/AC mA measurement
  - 5-6. DC/AC 10A measurement
  - 5-7 Temperature measurement
  - 5-8 Detecting AC electric field
- 6. Maintenance**
  - 6-1. Replacing the battery
  - 6-2. Replacing the fuse
  - 6-3. Cleaning and Decontamination

# 1. Introduction

This manual is used to MS8233F Digital Multi Meter only..

This Meter is a handheld and battery operated Digital Multi Meter(DMM) with multi function. This Meter is designed to meet IEC61010-1 & CAT III 600V over voltage category and double insulation. The meter with holster that is giving the main body, though downsized, high resistance against the shock of a drop.

**Protection provided by the instrument will be impaired if used in a manner not specified by the manufacturer.**

This operating instruction covers information on safety and caution. Please read relevant information carefully and observe all the warnings and note strictly.

The DMM as general measurement tool and widely used in the school, laboratory, factory and other social field.

# 2. Safety note



## 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 rule:

- Do not apply more than the rated voltage, of marked on the meter, between the input terminal and grounding terminal..
- Do not apply voltage between COM and OHM terminal, in the resistance measuring state.
- Do not measure current with test lead inserted into voltage or OHM

terminal.

- Do not expose the instrument to the direct sun light, extreme temperature and humidity or dew full.
- Inspect the test lead for damaged insulation or exposed metal.
- Before measuring current, check the Meter’s fuses and turn off power to the circuit before connecting the meter to the circuit.
- Disconnect circuit power and discharge all high voltage capacitors before testing continuity, diode, resistance, capacitance or current.
- **Hazardous voltages in the test before measurement of what is known voltage to determine that determine that the equipment is functioning correctly.**

Note international Electrical Symbol.

	Dangerous Voltage		Ground
	AC (Alternating current)		Warning see explain in manual
	DC (Direct Current)		Double insulation
	AC or DC		Fuse
	<b>This product has been tested to the requirements of AN/CSA-C22.2 No. 61010-1, second edition, including Amendment 1, or a later version of the same standard incorporating the same level of testing requirements”.</b>		
	<b>CONFORMS TO UL STD. 61010-1, IEC 61010-031 CERTIFIED TO CSA STD. C22.2 No. 61010-1 and 61010-031</b>		

### Measurement category(over voltage category):

This instrument is meet the safety condition of CAT III. The equipment is used for measurement in building facilities. Examples are measurements on distribution boards, circuit breaker and industrial equipment located in fixed facilities, as a fixed motor.

## 3. Explanation of controls and indicators

### 3-1. Meter illustration

- ① NCV indicator [LED]
- ② LCD display
- ③ “Hz%” push button
- ④ “BACK LIGHT” push button
- ⑤ ‘HOLD” push button
- ⑥ “FUNC” Push button
- ⑦ Rotary Switch (Knob)
- ⑧ “V/ $\Omega$ /Hz/uA/mA/ $^{\circ}$ C” Input terminal
- ⑨ “COM” input terminal
- ⑩ “10A” input terminal

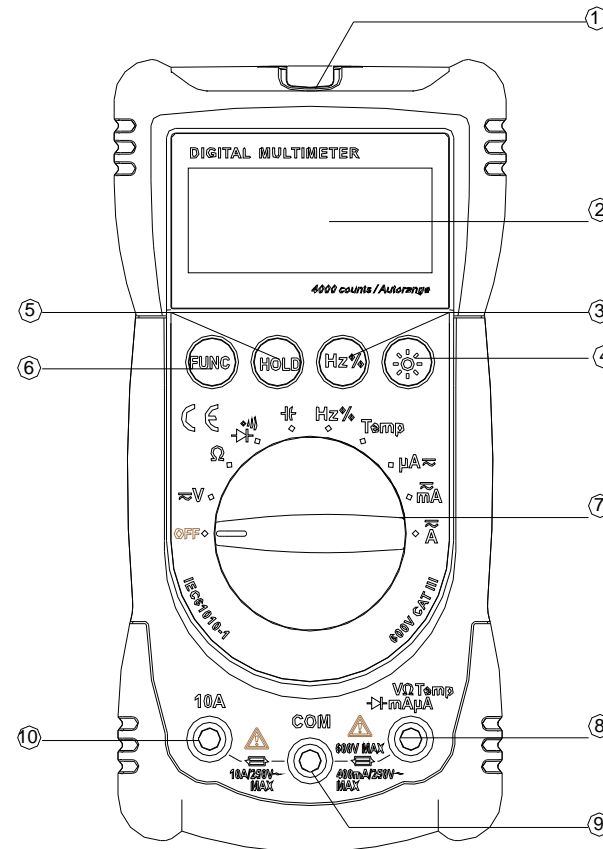


Fig. 1 Exterior view

### 3-2. Functional push button

Push button	Function
<b>Func</b>	“ <b>FUNC</b> ” key is the function select key that acts with trigger. Use the key as switch of DC/AC current, Diode/Continuity and °C/°F.
<b>HOLD</b>	Press “ <b>HOLD</b> ” to enter and exit the hold mode in any mode. That act with trigger.
<b>Hz%</b>	This key is act with trigger the duty function
<b>*</b>	This key is used control Backlight. This key is act with trigger. When press and hold the key over 2 sec, will enable Backlight. Press the key again , the backlight will disable.

### 3-3. Display indicators

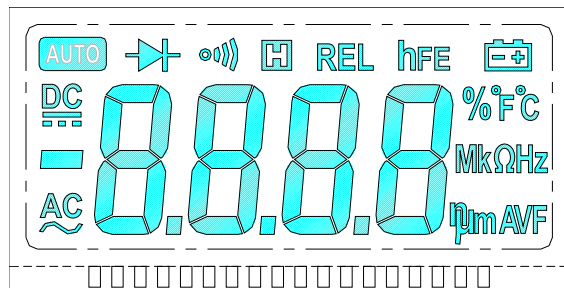


Fig. 2 LCD

Number	Indicator	Meaning
1		DC voltage or current
2		AC voltage or current
3		Diode
4	MAX	Maximum value
5	HOLD	Data hold
6		Low battery indicator
7	MK Ω	Ω K Ω M Ω is unit of resistance
8	°F	The unit of temperature ( °F : Fahrenheit)
9	μmVA	mV , V is unit of voltage μA, mA, A is unit of current
10	—	Indicate negative reading
11	Hz	Frequency Unit
12	nF, μF	Capacitance unit

## 4. Specification

### 4-1. General Specification

- Auto ranging DMM , that full scale is 4000 counts
  - Display : 3 3/4 digit LCD display..
  - Over load protection: Used the PTC protection circuit for Resistance, temperature and frequency measurement.
  - AC electric field detection function(NCV function)
  - DATA HOLD function
  - Back Light
  - Low battery indication
- 
- Auto Power- OFF. : If the meter is idle for 15 minutes (idle time), the meter automatically turns the power off. After auto power-off, pushing any of the push button or changing the rotary switch can turn on the meter again.
  - Operating temperature & Humidity: 0 ~ 40°C (32 ~ 104 °F) & < 80% RH
  - Storage temperature & Humidity: -10 ~ 50°C (14 ~ 122 °F) & < 70%RH
  - Power Supply: 9V Battery (6F22 or 1604A Type) x 1pc.
  - Safety Class: IEC 61010-1, CAT III 600V.
  - Dimension (L x W x H) & Weight: 140 x 67 x 30mm, Approx. 112g
- Accessory:**
1. K-type temperature probe
  2. Multi-Function Socket: MS3204

### 4-2. Electrical Specification ( at 23±5°C ; <75% RH)

#### 4.2.1 DC Voltage

Range	Resolution	Accuracy
400mV	0.1mV	± (0.5% rdg + 2dgt)
4V	0.001V	
40V	0.01V	
400V	0.1V	
600V	1V	± (0.8% rdg + 2dgt)

- 8 -

#### 4.2.2 AC Voltage

Range	Resolution	Accuracy
4V	0.001V	± (0.8% rdg + 3dgt)
40V	0.01V	
400V	0.1V	
600V	1V	± (1.0% rdg + 3dgt)

\* Frequency response: 40~400Hz

\* Average rectifier type.

#### 4.2.3 Resistance

Range	Resolution	Accuracy
400 Ω	0.1 Ω	± (0.8% rdg + 2dgt)
4k Ω	0.001k Ω	
40k Ω	0.01k Ω	
400k Ω	0.1k Ω	
4M Ω	0.001M Ω	± (1.0% rdg + 2dgt)
40M Ω	0.01M Ω	

#### 4.2.4 Diode check

Range	Resolution	Function
→	0.001V	Will display the forward drop voltage.

\* Operating current: about 1mA

\* Open circuit voltage: about 1.48V

#### 4.2.5 Continuity

Range	Function
•)	If measured resistance less than 30 Ω, will buzzer is sounded.

\* Open voltage: about 0.5V

#### 4.2.6 DC Current

Range	Resolution	Accuracy
400μA	0.1 μ A	□ ± (1% rdg + 3dgt)
4000μA	1μA	
40mA	0.01mA	
400mA	0.1mA	
10A	0.01A	

\* Over Load protection: use the fuse(F400mA H 250V) at μA /mA range,  
and use the fuse(F10A H 250V) at 10A range.

\* Max input current: 200mA at 'mA' input terminal and 10A at '10A' input terminal..

#### 4.2.7 AC Current

Range	Resolution	Accuracy
400μA	0.1μA	□ (1.2% rdg + 4dgt)
4000μA	1μA	□

40mA	0.01mA	
400mA	0.1mA	
10A	0.01A	

\* Over Load protection: use the fuse(F400mA H 250V) at μA /mA range,  
and use the fuse(F10A H 250V) at 10A range.

\* Max input current: 400mA at 'mA' input terminal and 10A at '10A' input terminal..

\* Frequency response: 40 ~ 400Hz

#### 4.2.8 Temperature

Fahrenheit Temperature [°F]		
Range	0°F~1800°F	
Resolution	1°F	
Accuracy	-0°F~50°F	□ (5% rdg + 4dgt)
	50°F~750°F	□ (1.5% rdg + 3dgt)
	750°F~1800°F	□ (3% rdg + 3dgt)

#### 4.2.9 Frequency

Range	Accuracy
0.1Hz~10M Hz	0.1Hz~10MHz

\* Sensitivity: 3V

#### 4.2.10 Duty

Range	Accuracy
0.1%~99%	1%

#### 4.2.11 capacitance

Range	Resolution	Accuracy
4nF	0.001nF	□ ± (3% rdg + 3dgt)
40nF	0.01nF	
400nF	0.1nF	
4μF	1nF	
40μF	10nF	
200μF	100nf	

Range	Accuracy
0.1Hz~10M Hz	0.1Hz~10MHz

## 5. Measurement operation

### 5-1 DC & AC voltage measurement



#### Warning

**To avoid harms to you or damage to the meter from electric shock. Please do not attempt to measure voltage higher than DC/AC 1000V although readings may be obtained.**

The DC voltage range are 400.0mV, 4.000V, 40.00V , 400.0V and 600V and then. The AC voltage ranges are 4.000V, 40.00V, 400.0V and 600V.

To measure DC or AC voltage:

1. Insert the red test lead into the “**V Ω**” input terminal and the black test lead into the COM terminal.
2. Set the rotary switch to **DC or AC** range.
3. Connect the test lead across with the object under testing.

The measured value will be show on the LCD display.

Note:

- When DC or AC voltage measurement has been completed, disconnect the connection between the testing lead and the circuit under testing.

### 5-2. Resistance measurement

The resistance range are: 400.0 Ω , 4.000K Ω ,40.00K Ω , 400.0K Ω , 4.000M Ω .  
40.00M Ω .

To measure resistance, connect the meter as follows:

1. Insert the red test lead into the ”**V Ω**” terminal and the black test lead into the COM terminal.
2. Set the rotary switch to proper resistance range..
3. Connect the test lead across with the object under testing.

The measured value will be show on the LCD display.

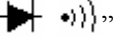
Note:

- The test lead can add 0.1 Ω to 0.2 Ω of error to resistance

measurement. To obtain precision reading in low-resistance measurement, that is the range of  $400.0\ \Omega$ , short the input terminal before measuring. In this time, the contact resistance displayed on the LCD. You can subtract the contact resistance value from the measured value.

- For high-resistance measurement ( $>10M\ \Omega$ ), it is normal taking several second to obtain stable reading.
- The LCD display “OL” indicating open-circuit for the tested resistor or the resistor value is higher than the maximum range of the meter.

### 5-3. Diode/Continuity check

- ① Set the rotary switch to “” position. First time, default mode is diode check mode. You can enter the continuity check mode by the “FUNC” Key.
- ② insert the red test lead into the “**V  $\Omega$  Hz**” terminal and the black test lead into the “COM” terminal.
- ③ Use the diode test mode to check diodes, transistors and other semiconductor device. In the diode test mode sends a current through the semiconductor junction, and the measure the voltage drop across the junction. A good silicon junction drop between 0.5V and 0.8V.
- ④ For forward voltage drop reading on any semiconductor component, place the red test lead on the component anode and place the black test lead on the component cathode. The measured value show on the display.
- ⑤ Reverse the test lead and measure the voltage across the diode again.
  - If diode is good, the display shows “OL”.

- If diode is shorted, the display shows 0 (zero) in both direction.
- If display shows “OL” in both direction, the diode is open.

Continuity Check: Press the “FUNC” key to enter to the continuity mode.

- ⑥ The buzzer sound if the resistance of a circuit under test is less than  $30\ \Omega$ .

### 5-4. Frequency measurement

1. Set the rotary switch to “Hz” position.
2. Insert the red test lead into the “**V  $\Omega$  Hz**” input terminal and the black test lead into the “COM” terminal.
3. Connect the test leads across with the circuit under testing. The measured value shown on the LCD display.

### 5-5. DC/AC $\mu$ A or mA measurement

DC Current range is  $400.0\ \mu\text{A}/4000\ \mu\text{A}$  and  $40.00\ \text{mA}/400.0\ \text{mA}$  and then 10A range.

AC Current range is  $400.0\ \mu\text{A}/4000\ \mu\text{A}$  and  $40.00\ \text{mA}/400.0\ \text{mA}$  and then 10A range.

1. Turn off power to the circuit. Set the rotary switch to the proper DC/AC  $\mu$ A or DC/AC mA position.
2. 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.
3. Turn on power to the circuit. The measured value show on the display.



### 5-6. DC/AC 10A measurement

1. Insert the red test lead into the input terminal marked as “10A”.
2. The measuring procedure is same as that of 5-5 section..

#### Note:

- For safety’s sake, the measuring time for high current should be  $\leq 10$  second for each measurement and the interval time between two measurement should be greater than 5 minutes.
- When current measurement has been completed, disconnect the connection between the testing lead and the circuit under test.

### 5-7 Temperature measurement

To measuring temperature must be use the Type Special Socket: MS3204.

1. Set the rotary switch to the “TEMP” range. In this time, The environment temperature value displayed on the LCD.
2. Insert the Socket to the two “COM” and “TEMP” terminals.
3. Insert the K-type temperature probe to the two insert holes of Socket. User should be take note of it’s polarity.
4. The measured temperature value will be displayed on the LCD.

### 5-8 Capactiance measurement

4. Set the rotary switch to “capactiance” position.
5. Insert the red test lead into the “**V  $\Omega$  Hz**” input terminal and the black test lead into the “**COM**” terminal.
6. Connect the test leads across with the circuit under testing. The measured value shown.

on the LCD display.

### 5-9 Detecting AC electric field [ NCV function]

The red LED on the upper area on the front panel lights up and then flickering

at all function

Mode except for OFF when electric field exceeding AC 110V is detected by the metal piece sensor

that is incorporated in the inner upper area of front case.


It indicates a presence of AC voltage in an electrical cricuit or equipment without touching them. Detectuib against in-wall outlet is possible.

NOTE: In the some time, when measuring AC voltage, the red LED is lights.

You should be ignore this.

## 6. Maintenance

### 6-1. Replacing the battery

When meter display  the battery must be replace to maintain normal operation.

- ① Disconnect and remove all test probes from any live source and meter.
- ② Open the battery cover on the bottom case by screwdriver.
- ③ Remove old battery and snap new one into battery holder



**warning TO AVOID ELECTRICAL SHOCK, REMOVE TEST LEADS BEFORE OPENING BATTERY COVER.**

**RISQUE DE CHOC ÉLECTRIQUE, RETIRER CORDONS DE MESURE D'OUVERTURE AVANT couvercle des piles.**

## **6-2. Fuse replacement**

Replacing the defective fuse should be done according to the following procedure.

- i. To avoid electrical shock, remove the test lead and any input signal before opening the bottom case.
- ii. Open the bottom case and then remove the defective fuse and insert a new fuse of the same size and rating (F400mA H250V or F10A H250V) .
- iii. Replace the bottom case and reinstall all the screws.

## **6-3. Test lead replacement**

The test lead has been used and replaced shall comply with the requirements specified by the manufacturer in order to ensure operation safety,(1000V CATII 10A)

## **6-4. Cleaning and Decontamination**

The meter can be cleaned with soft clean cloth to remove any oil, grease or grime.

Do not use liquid solvent or detergent.

END —