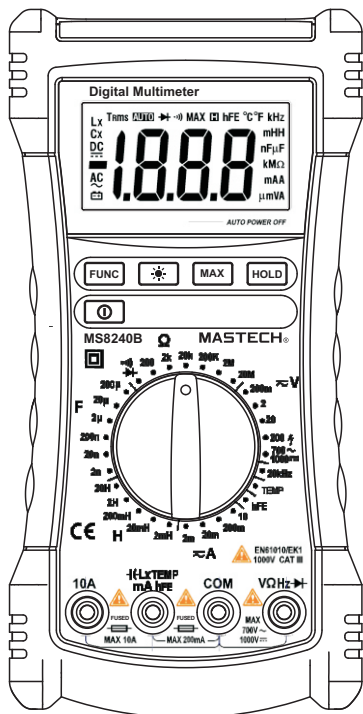


MASTECH® MS8240B

Digital Multimeter Operating Instruction



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1. Introduction

This Meter is a handheld and battery operated Digital Multi Meter(DMM) with multi function. This Meter is designed to meet IEC-61010-1 CAT III 1000V over voltage category and double insulation. The entire outer surface of the case has been formed with thermo plastic elastomer, giving the main body, though downsized, high resistance against the shock of a drop. 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 etc 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
- 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.

Note international Electrical Symbol.

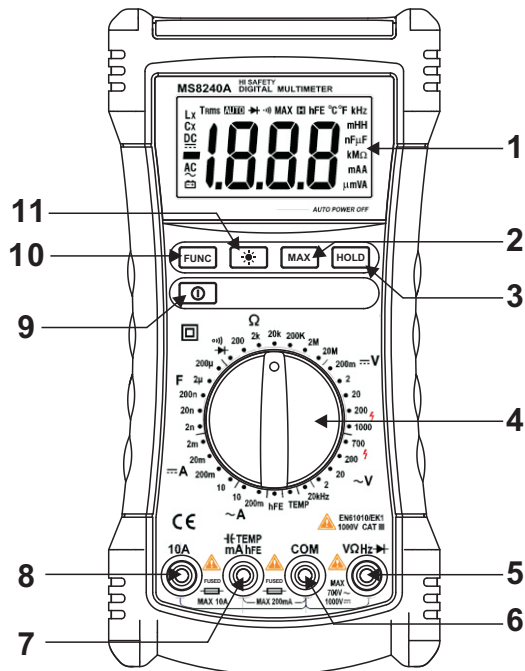
	Dangerous voltage		Grounding
	AC (Alternating Current)		Warning see explain in manual
	DC (Direct Current)		Double insulation
	AC or DC		Fuse

3. Explanation of Controls and Indicators


3.1 Meter Illustration

- (1) LCD Display
- (2) "MAX" push button
- (3) "HOLD" push button
- (4) Rotary Switch (Knob)
- (5) "V. Ω. Hz" Input terminal
- (6) "COM" terminal
- (7) "μA.mA. °C.Cx.Lx.hFE" Input terminal
- (8) "10A" input terminal
- (9) Power switch(ON.OFF)
- (10) "FUNC" push button
- (11) "BKLIT" push button

FRONT PANEL







3.2 Functional Push Button

Push button	Function
	ON/OFF Lock type Power Switch.
FUNC	"FUNC" key is the function select key that acts with trigger. Use the key as switch of DC/AC voltage, DC/AC current, Resistance/Continuity and °C/°F.
HOLD	Press "HOLD" to enter and exit the hold mode in any mode. That act with trigger.
MAX/MIN	This key is act with trigger. Press this key once, the maximum value is holding (Will displays 'MAX' symbol in the LCD). After pressing the key, A/D will keep working, and the display value are always up dated and kept the maximum value. (The actual gained value is not the peak value.).
Back light	This key is used to control Backlight. This key is act with trigger. When press the key, will enable Backlight for 15 sec. Press the key again within 15 sec, 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	MkΩ	Ω KΩ MΩ is unit of resistance
8	°C/°F	The unit of temperature (°C: Centigrade; °F: Fahrenheit)
9	μmVA	uV mV V is unit of voltage uA mA is unit of current
10	—	Indicate negative reading
11	Cx	Capacitance Indicator
12	Lx	Inductance Indicator
13	mH/H	Inductance Units
14	nμmF	Capacitance Units

4. Technical Specifications

4.1 General Specifications

- Manual ranging DMM , that full scale is 1999 counts
- Display : 3 1/2 digit LCD display.
- Over load protection: Used the PTC protection circuit for Resistance, capacitance And frequency measurement.
- DATA HOLD function
- MAX value measurement function
- Back Light
- Low battery indication
- Auto Power- OFF.
- Operating temperature & Humidity: 0 ~ 40°C (32~104°F) & < 80% RH
- Storage temperature & Humidity: -10 ~ 50°C (14~122°F) & <70%RH
- Power Supply: 1.5V Battery(AA Type)×4
- Safety Class: IEC-61010-1, 1000V CAT III, 600V CAT IV.
- Dimension (L×W×H) & Weight: 205 mm×102 mm×58mm, Approx. 390g.

4.2 Electrical Specification(at 23±5°C <75% RH)

4.2.1 DC voltage

Range	Resolution	Accuracy
200mV	0.1mV	±(0.5% rdg + 2dgt)
2V	1mV	
20V	10mV	
200V	100mV	
1000V	1V	

- * Input impedance: 10MΩ
- * Over load protection: 250V DC/AC(rms) at 200mV Range.
- * Max input voltage: 1000VDC

4.2.2 AC voltage

Range	Resolution	Accuracy
200mV	0.1mV	±(0.8% rdg + 3dgt)
2V	1mV	
20V	10mV	
200V	100mV	±(1.0% rdg + 5dgt)
1000V	1V	


- * Input impedance: 10MΩ
- * Over load protection: 250V DC/AC(rms) at 200mV Range.
- * Frequency response: 40~400Hz
- * Average rectifier type.
- * Max input voltage: 750V AC rms

4.2.3 Resistance

Range	Resolution	Accuracy
200Ω	0.1Ω	±(0.8% rdg + 3dgt)
2kΩ	0.001kΩ	
20kΩ	0.01kΩ	
200kΩ	0.1kΩ	
2MΩ	0.001MΩ	±(1.5% rdg + 5dgt)
20MΩ	0.01MΩ	


- * Over load protection: 250V DC/ AC rms

4.2.4 Diode

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

* Over load protection: 250V DC/ AC rms

4.2.5 Continuity

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

* Over load protection: 250V DC/ AC rms

4.2.6 DC Current

Range	Resolution	Accuracy
2mA	1μA	(1.0% rdg + 3dgt)
20.00mA	0.01mA	
200.0mA	0.1mA	
10.00A	0.01A	(2.0% rdg + 3dgt)

* Over protection: use the fuse(F250mA/1KV) at mA range, and use the fuse(F10A/1KV) at 10A range.

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

4.2.7 AC Current

Range	Resolution	Accuracy
2mA	1μA	(1.5% rdg + 5dgt)
20mA	0.01mA	
200.0mA	0.1mA	
10.00A	0.01A	(3.0% rdg + 10dgt)

* Over protection:use the fuse(F250mA/1KV) at mA range, and use the fuse(F10A/1KV) at 10A range.

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

* Frequency response:40 ~ 400Hz

4.2.8 Temperature

You can selecting Centi-degree[°C] or Fahrenheit [°F] by "FUNC" key.

Range	-20°C ~ 1000°C	
Resolution	1°C	
Accuracy	-20°C~0°C	(5.0% rdg + 4dgt)
	0°C~400°C	(1.0% rdg + 3dgt)
	400°C~1000°C	(2.0% rdg + 3dgt)
Fahrenheit Temperature [°F]		
Range	0°F~1800°F	
Resolution	1°F	
Accuracy	-0°F~50°F	(5.0% rdg + 4dgt)
	50°F~750°F	(1.0% rdg + 3dgt)
	750°F~1800°F	(2.0% rdg + 3dgt)

* Over load protection: use the fuse[F250mA/1KV].

4.2.9 Capacitance

Range	Resolution	Accuracy
2nF	0.001nF	±(4.0%rdg +5dgt)
20nF	0.01nF	
200nF	0.1nF	
2μF	0.001nF	
20μF	0.01μF	
200μF	0.1μF	±(5.0%rdg +10dgt)

* Over load protection: use the fuse[F250mA/1KV]

4.2.10 hFE

Range	Function
hFE	hFE: 1~1000

* Over load protection: use the fuse [F250mA/1KV]

4.2.11 Frequency

Range	Resolution	Accuracy
20kHz	1HZ	±(1.5%rdg+5dgt)

* Sensitivity: 200mV -5V AC rms

* Over load protection: 250V DC/AC rms

4.2.12 Inductance

Range	Resolution	Accuracy
2mH	0.001mH	±(4.0%rdg +8dgt)
20mH	0.01mH	±(4.0%rdg +3dgt)
200mH	0.1mH	±(4.0%rdg +3dgt)
2H	1mH	±(4.0%rdg +3dgt)
20H	10mH	±(4.0%rdg +5dgt)

• Over load protection: use the fuse [F250mA/1KV]

5. Measurement Operation

5.1 DC & AC Voltage Measurement



To avoid harms to you or damage to the meter from electric shock. Please do not attempt to measure voltage higher than DC 1000V/AC 700Vrms although readings may be obtained.

The DC voltage ranges are 200.0mV, 2.000V, 20.00V, 200.0V and 1000V; and then. The AC voltage ranges are 200.0mV, 2.000V, 20.00V, 200.0V and 750.0V. To measure DC/AC voltage:

1. Insert the red test lead into the "VΩ" input terminal and the black test lead into the COM terminal.
2. First time, Default mode is DC measurement mode, you can select the AC voltage mode by 'FUNC' key.
3. Set the rotary switch to proper DC/AC mV or V range.
4. Connect the test lead across with the object being measured. The measured value will be show on the LCD display.
6. If the "OL" symbol is displayed on the LCD, you must be set the rotary switch to the higher range.

Note:

In the rang of 200mV in DC/AC and 2V AC, even in the absence of input or connectivity test leader, there also have something display on LCD. in this case, short-circuit "V" and "COM", so that LCD display back to zero.

5.2 Resistance Measurement



To avoid damage to the Meter or to the equipment under test, disconnect power and discharge all high-voltage capacitors before resistance measurement.

The resistance range are: 200Ω, 2.000kΩ, 20.00kΩ, 200.0kΩ, 2.000MΩ, 20.00MΩ.

To measure resistance, connect the meter as follows:

1. Insert the red test lead into the "VΩ" terminal and the black test lead into the COM terminal.
2. Set the rotary switch to proper resistance range. Connect the test lead across with the object being measured. The measured value will be display on the LCD.

Note:


The test lead can add 0.1Ω to 0.2Ω of error to resistance measurement. To obtain precision reading in low-resistance measurement, that is the range of 200.0Ω, 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 (>10MΩ), 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




To avoid damage to the Meter or to the equipment under test, disconnect power and discharge all high-voltage capacitors before Diode/Continuity check.

1. insert the red test lead into the "VΩ" terminal and the black test lead into the COM terminal.
2. Set the rotary switch to  Ω position.
2. 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 LCD.
3. Select the continuity check mode by the "FUNC" key. The buzzer may be sound if the resistance of a circuit under test is less than 30Ω.

5.3 Capacitance Measurement



To avoid damage to the Meter or to the equipment under test, disconnect power and discharge all high-voltage capacitors before Diode/Continuity check.

1. insert the red test lead into the "VΩ" terminal and the black test lead into the COM terminal.
2. Set the rotary switch to  Ω position.
2. 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 LCD.
3. Select the continuity check mode by the "FUNC" key. The buzzer may be sound if the resistance of a circuit under test is less than 30Ω.

5.5 Capacitance Measurement

Warning

To avoid damaging meter or device to be measured, before continuity tests, turn off all circuits to be tested and discharge all capacitors.

The capacitance measuring range of this meter: 2.000nF, 20.00nF, 200.0nF, 2.000uF and 200.0uF.

Method of measuring capacitance:

1. Rotate switch to the appropriate position.
2. Connect black and red test probe to COM input socket and V input socket, respectively. (You can also use the dedicated multifunction test holder to measure capacitance).
3. Measure the two leads of the capacitor to be tested with other two ends of test probes and read the measured value from LCD display.

Note:

When measuring bulk capacitors with this meter, readings will be stabilize after a few seconds.
When measuring the small capacitor with less than 20nF, the distributed capacitance (displayed base number) of the meter and wire should be subtracted.

5.6 Transistor Measurement

Warning

Do not apply any RMS voltage higher than 250V DC or AC between common end and hFE end.
This prevents electrical shock and/or meter damage.

Method of measuring transistor:

1. Rotate the switch to hFE position.
2. Plug multi-function socket with correct polarity (the "+" end of multi-function socket is connected with hFE end, "COM" end is connected with common end).
3. Determine that the transistor is NPN or PNP type, then insert three pins of transistor, e.b.c, to the corresponding holes of dedicated multi-functional socket.
4. Read hFE approximation of transistor to be measured from LCD display.

5.7 Frequency Measurement

Warning

Do not measure the frequency of RMS voltage higher than 250V DC or AC. This prevents electrical shock and/or meter damage.

Method of measuring frequency:

1. Rotate switch to 20KHZ position.
2. Connect black and red test probe to COM input socket and HZ input socket, respectively.
3. Measure the frequency value of circuit to be tested with other two ends of test probes.
4. Read the measured frequency value from LCD display.

Note:

Do not input the voltage over 10V RMS, as accuracy of readings cannot be guaranteed.

5.8 Current Measurement

Warning

To avoid damage to meter or device, before measuring current, please check the meter's fuse. When measuring, use correct input socket, function selection and measuring range. When the circuit voltage is over 250V, do not attempt to measure current on the circuit.

When the test probe is inserted to the current input socket, don't connect the other end of the test probe with any circuit in parallel.

DC measuring range of meter:
2.000mA, 20.00mA, 200.0mA and 10.00A;
AC measuring range: 200.00mA and 10A.

Method of measuring current:

1. Turn off the power supply and discharge all high voltage capacitors on the circuit to be tested.
2. Rotate switch to the appropriate position.
3. Connect the black test probe to the COM input socket. If the current to be tested is lower than 200mA, connect the red test probe to the mA input socket. If the measured current is between the range of 200mA~10A, the red test probe should be connected to 10A input socket.
4. Turn off the circuit to be tested. Connect the black test probe to the low voltage end of disconnected circuit to be tested and the red test probe is connected to the other end (high voltage) of disconnected circuit.
5. Connect the power supply to the circuit, then read the LCD display. If the display shows only "OL", it means that the input is out of the selected input range. Please rotate the switch to a higher measuring range.
6. Turn off the power to the circuit tested. Discharge all the capacitors, remove the test probes from the meter and restore the circuit to the original state.

Note:

1. When measuring current, the meter should be connected in series, instead of in parallel, to avoid the meter damage and risking personal safety.
2. Lengthy measurements of large currents (>10A) will affect the display accuracy of the meter. Standard test time cannot be over 10 seconds in any 3 minute period.
3. During DC measurement, if the test probes are connected in reversal order to the circuit, the display will become negative, but the measurement accuracy of the meter will not be affected.

5.9 Temperature Measurement

Warning

Do not input any voltage higher than 12V DC or AC RMS within the temperature measuring range, to avoid damage to the meter.


Method of measuring temperature:

The MS3203 multifunction socket with K-type temperature probe is required for measuring temperature.

1. Rotate the knob to the TEMP position. The LCD will display "OL" and temperature unit °C.
2. When inserting the multifunction socket, insert "COM" and "V" leads of the socket in the comm end and current MA jacket respectively.
3. Then insert the temperature probe into the side temperature jacket of the multifunction socket. Note the polarity of the attachment. The LCD will display the temperature of the current environment.
4. The other end of the temperature probe (the temperature sensor) is put into the object to be tested. The LCD will display the temperature at the location of the current sensor.
5. Press the "FUNC" key to convert the measured value to °F, or set the temperature unit to °F first before measuring.

6. Maintenance

6.1 Battery Replacement

When the  symbol shows on the display during use of the meter, you must replace the batteries, to avoid affecting the normal use of the meter.

Method of replacing batteries:

1. Disconnect the test wire. Switch off the power.
2. Open the battery cover on the rear of the case with the screwdriver, and remove the batteries.
3. Install batteries with same specification, and secure the cover.

6.2 Fuse Replacement

Steps for replacing fuse:

1. First remove the test wire, and switch off the meter.
2. Open the battery cover on the rear cover with the screwdriver, and remove the damaged fuse.
3. Install a fuse with same specification, put the battery cover in place again, and tighten the screws.

6.3 Cleaning

Please wipe the surface of the meter with the soft cloth and mild detergent, if necessary. Do not use organic solvents as they will corrosion the meter's case.



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