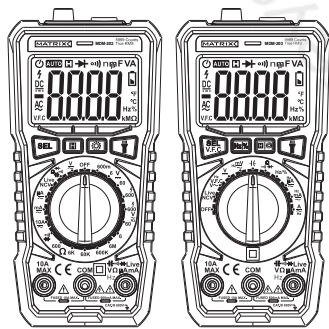


Digital Multimeter Instruction Manual



MDM-202 Manual Digital Multimeter

MDM-203 Automatic Digital Multimeter



MATRIX TECHNOLOGY INC.

Thank you for choosing MATRIX.
Before you use this product please read this manual carefully as it will familiarize you with the correct operating procedure for your MATRIX Digital Multimeter.

Summary

MDM-202 and MDM-203 are miniature intelligent, digital multimeters. The MDM-202 is a manual range, automatic polarity multimeter with 3 5/6 (5999) display. The MDM-203 features automatic range, automatic polarity and a 4-bit (9999) display. Both utilise stable performance, high precision, high reliability and overload protection function. Powered by 2xAAA 1.5V battery, this instrument features an LCD display with a super large screen. It is easy to carry and a highly valued piece of equipment for users. The backlight can be programmed to turn off automatically after 30 seconds. The MDM-200 series of instruments can measure parameters including: AC/DC voltage, DC current, resistance, diodes, carry out on-off tests, zero-line judgement, non-contact voltage detection and the true effective value of AC. It is a tool with excellent performance, the ideal tool for laboratories, factories, radio enthusiasts and when carrying out home improvements.

Safety matters

This series of instruments are designed in accordance with IEC61010-1 (Safety Standard promulgated by the International Electrotechnical Commission). Please read safety precautions before using them.

- Do not use to measure AC or DC voltages above 600V.
- When measuring the voltages above 36V DC or 25V AC it is necessary to check whether the pen contacts the test point reliably, connects correctly, and insulates well, so as to avoid electric shock.
- When changing function and range of the multimeter, remove the pen from the test point.
- Read this manual to ensure you have chosen the correct range and operation for your test requirements to avoid injury or damage to the device. Although the MDM-203 series features full range protection, please consider your safety at all times when operating with any voltage.

- When measuring current, do not input current exceeding 10A.
- Safety symbols illustration: "⚠" there is dangerous voltage, "⚡" electrical grounding, "⚡" double insulation, "⚠" The operator must refer to the instruction manual, "🔋" low device battery.

Troubleshooting

If your instrument does not work properly, the following methods can help you quickly solve general problems, if the failure is still not eliminated, please contact the maintenance center or dealer.

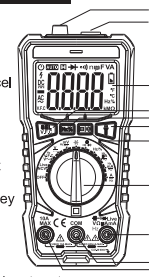
Failure phenomenon	Inspection position and method
No display	Battery polarity reversed Power is not connected Replace batteries
Low battery symbol display	Replace batteries
Current not displayed	Replace fuses
Incorrect Resistance Displayed	Poor connection between test pen and circuit

MDM-202 Operation panel instructions

- NCV Induction region
- LED Light
- LCD Display Area
- SEL function conversion key (Press and hold to change to frequency measurement for AC voltage)
- Data Hold Key
- Flashlight Button (press this button to turn on the light, you can turn off the sound and light prompt later)
- Backlight turn-on and turn-off key (automatic turn-off 30 seconds after backlight turn-on)
- Functional range switch
- Voltage/Resistor/Diode/On-off/Current/Firewire measurement input port
- COM input port; negative input port, insert black pen
- 10A input port

MDM-203 Operation panel instructions

- NCV Induction Region
- LED Light
- LCD display area
- SEL function conversion key (press SEL to turn on and cancel automatic shutdown)
- HOLD data hold key
- Flashlight button (press this button to turn on the light, you can turn off the sound and light prompt later)
- Backlight turn-on and turn-off key (automatic turn-off 30 seconds after backlight turn-on)
- Functional Range Switch
- Voltage/Resistor/Diode/On-off/Current/Firewire measurement input port
- COM input port; negative input port, insert black pen
- 10A input port



Characteristic

1. General characteristics

- Display mode: LCD display;
- Maximum Display:
MDM-202 : 5999 digit,
MDM-203 : 9999 digit, automatic polarity display;
- Measurement Method: double integral A/D conversion;
- Sampling Rate: approx. 3 times per second;
- Overrange Display: the highest bit display "OL";
- Low Voltage Display: "🔋" symbol appears;
- Working Environment: (0-40) °C, relative humidity less than 80%;
- Power Supply: 2xAAA 1.5V batteries;
- Volume (size): 148x70x42mm (length * width * height);
- Weight: 200 g (including batteries);

2. Technical characteristics

Accuracy: (reading a%+the lowest effective digit) to ensure the accuracy of environmental temperature: (23±5) °C, relative humidity less than 75%, the calibration guarantee period is one year from the factory date.

3. Technical Indicators

A. DC voltage (DCV) MDM-202

Range	Resolution	Accuracy
600mV	10µV	±0.5%reading±5digit
6V	1mV	±0.8%reading±5digit
60V	10mV	±0.8%reading±5digit
600V	1V	±0.8%reading±5digit

Input Impedance: 10MΩ, overload protection: 600V DC or AC RMS.

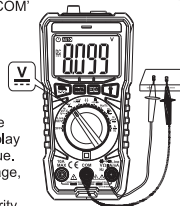
B. DC voltage (DCV) MDM-203

Range	Resolution	Accuracy
*99.99mV	10µV	±0.5%reading±2digit
**999.9mV	100µV	±0.5%reading±2digit
9.999V	1mV	±0.5%reading±2digit
99.99V	10mV	±0.5%reading±2digit
600V	1V	±0.8%reading±2digit

Input impedance: * Range≥100MΩ, ** Range≥1GΩ, other ranges input impedance is 10MΩ (**/There will be unstable digital display in the open circuit of the range, it will be stable after loading (≤1 digit).
Overload protection: 600V DC or AC RMS.

The specific operation is as follows:

- Insert the black pen into the "COM" jack and the red pen into the "VΩmA" jack.
- Turn the range switch to the corresponding "V" range and display it as a DC voltage measurement mode.
- Use the test pen to contact the test point. The screen will display the measured DC voltage value. When measuring the DC voltage, the point where the red pen is connected is the positive polarity of the voltage



- Note:
- Input voltage must not exceed DC600V or AC600V, if exceeded, there is a danger of damaging the instrument circuit.
 - When measuring high voltage circuits, special attention should be paid to avoiding electric shock. After completing all measurement operations, disconnect the test pen from the circuit under test.

C. AC voltage (ACV) MDM-202

Range	Resolution	Accuracy
6V	1mV	±1.0%reading±3digit
60V	10mV	
600V	1V	

Input impedance: 10MΩ, overload protection: 600V DC or AC RMS.

D. AC voltage (ACV) MDM-203

Range	Resolution	Accuracy
*99.99mV	10µV	±1.2%reading±3digit
**999.9mV	100µV	±1.2%reading±3digit
9.999V	1mV	±1.0%reading±3digit
99.99V	10mV	
600V	1V	

Input Impedance: * Range≥100MΩ, ** Range≥1GΩ, other ranges input impedance is 10MΩ (**/In this range the displayed reading will be unstable at first when testing an open circuit, it will be stable after loading (≤1 digit). Overload protection: 600V DC or AC RMS.

The frequency response of standard sinusoidal and triangular waves is 40Hz-1KHz; Frequency response of other waveforms is 40Hz-200Hz.

The specific operation is as follows:

- Insert the black pen into the "COM" jack and the red pen into the "VΩmA" jack.
- Turn the range switch to the corresponding "V" range and display it as a AC voltage measurement mode. To measure frequency and duty ratio press "Hz%" key.

Note:

- There are some residual figures in each range before testing, but it does not affect the accuracy of measurement.
- Input voltage must not exceed 600V RMS, if exceeded, there is a danger of damaging the instrument circuit.
- When measuring high voltage circuits, special attention should be paid to avoiding electric shock.
- After completing all measurement operations, disconnect the test pen from the circuit under test.

E. V.F.C Variable frequency voltage measurement (Only MDM-203 has this function)

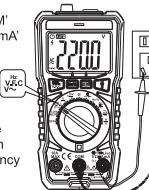
Range	Resolution	Accuracy
600V	0.1V	±1.2%reading±5digit

Input impedance: 10MΩ; Overload protection: 600V DC or AC RMS.

The frequency response of standard sinusoidal and triangular wave is 40 Hz-1 KHz; the frequency response of other waveforms is 40 Hz-200 Hz.

The specific operation is as follows:

- Insert the black pen into the "COM" jack and the red pen into the "VΩmA" jack.
- Switch the range switch to the corresponding "V" and display it as AC voltage measurement mode. Press the "V.F.C" key more than 2 seconds then switch to the "V.F.C" measurement mode. Switch "Hz%" key to measure the frequency and duty ratio.



- Note:
- There are some residual figures in each range before testing, but it does not affect the accuracy of measurement.
 - Input voltage must not exceed 600V RMS, if exceeded, there is a danger of damaging the instrument circuit.
 - When measuring high voltage circuits, special attention should be paid to avoiding electric shock.
 - After completing all measurement operations, disconnect the test pen from the circuit under test.

F. DC Current (DC µA mA) MDM-202

Range	Resolution	Accuracy
600µA	0.01µA	±1%reading±2digit
6000µA	0.1µA	
60mA	10µA	
600mA	100µA	±2.0%reading±2digit

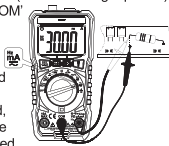
G. DC current (DC µA mA) MDM-203

Range	Resolution	Accuracy
999.9µA	0.01µA	±1%reading±2digit
9999µA	0.1µA	
99.99mA	10µA	
600mA	100µA	±2.0%reading±2digit

Maximum measured voltage drop 600mV;
Overload protection: 600mA instant ceramic fuse.

The specific operation is as follows: (such as the right picture)

1. Insert the black pen into the 'COM' jack and the red pen into the 'VΩmA' jack.
2. Turn the range switch to the corresponding 'mA' position, and then connect the instrument in series to the circuit to be tested, and the measured current value and the current polarity of the red pen point will be displayed on the screen simultaneously.



Note:

- a. Turn off the power supply in the return circuit before the instrument is connected in series to the return circuit to be tested.
- b. The maximum input current is 600 mA (depending on where the red pen is inserted), excessive current will damage the fuse of the device. Do not connect the test pen in parallel to any circuit when measuring current, it will damage the fuse and the instrument.
- c. After completing all measurement operations, the power supply of the circuit under test should be switched off first, and then the connection between the test pen and the circuit under test should be disconnected, this is important when measuring large currents.
- d. Do not connect more than 36V DC or 25V AC voltage between current jack and 'COM' jack.

I. AC current (AC μA mA) MDM-202

Range	Resolution	Accuracy
600μA	0.01μA	±1%reading±5digit
6000μA	0.1μA	
60mA	10μA	
600mA	100μA	±2.0%reading±5digit

J. AC current (AC μA mA) MDM-203

Range	Resolution	Accuracy
999.9μA	0.01μA	±1%reading±5digit
9999μA	0.1μA	
99.99mA	10μA	
600mA	100μA	±2.0%reading±5digit

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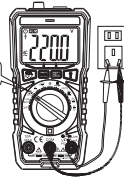
Input sensitivity: 9.999 Hz~9.9 MHz input frequency voltage range: 100 mV to 10 V RMS; Overload protection: 250 V DC or AC RMS.
9.999 Hz~9.999KHz input frequency voltage range: 100mV to 600V RMS.

K. Duty ratio

Range	Gear	Accuracy
10%~95%	Hz/%	±1.0%reading±5digit

The specific operation is as follows:

1. Insert the test pen or shielded cable into the 'COM' and 'VΩHz' jack.
2. Switch the range switch to the 'Hz' position and connect the pen or cable to the signal source or the load under test.



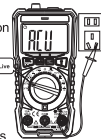
Note:

- a. In the 'Hz%' mode, when the input value exceeds 10 V values can be read but may be out of tolerance;
- b. When measuring more than 10V RMS, please use 'ACV' position and press 'HZ%' key to switch to frequency display.
- c. The use of shielded cables are the best way to measure small V signals.
- d. When measuring high voltage circuits, special attention should be paid to avoiding electric shock.
- e. In the 'Hz%' position please do not input voltages exceeding 250V DC or AC RMS in order to avoid damaging the instrument.

L. Zero line/Fire line measurement (Live)

The specific operation is as follows:

1. Turn the range switch to the 'Live/NCV' position (Screen displays 'ACV' in unmeasured state).
2. Insert the red pen into the 'VΩmA Live' jack (single pen insert is enough).
3. Insert the tip of the red pen into the zero line or the Fire Line. If using the Fire Line, the buzzer will emit a continuous sound while the panel indicator flashes and the screen displays '---'. If using the Zero Line, the instrument emits a intermittent sound of while the panel indicator flashes and the screen displays '---'.

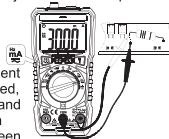


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Maximum measured voltage drop 600mV;
Overload protection: 600mA instant ceramic fuse.

The specific operation is as follows:

1. Insert the black pen into the 'COM' jack and the red pen into the 'VΩmA' jack.
2. Turn the range switch to the corresponding 'mA' position, press 'SEL' key to convert to AC current, then connect the instrument in series into the circuit to be tested, and the measured current value and the current polarity of the red pen point will be displayed on the screen at the same time.



Note:

- a. Turn off the power supply in the circuit before the instrument is connected in series to the circuit.
- b. The maximum input current is 600mA (depending on where the red pen is inserted), excessive current will damage the fuse of the device. Do not connect the test pen in parallel to any circuit when measuring current, it will damage the fuse and the instrument.
- c. After completing all measurement operations, turn off the power supply of the circuit under test, and then break the connection between the test pen and the circuit under test, this is more important to measure the large current.
- d. Do not connect more than 36V DC or 25V AC voltage between current jack and 'COM' jack.

M. DC current 10A (DCA)

Range	Resolution	Accuracy
10A	1mA	±3.0%reading±2digit

N. DC current 10A (ACA)

Range	Resolution	Accuracy
10A	1mA	±3.0%reading±5digit

Maximum measured voltage drop 100mV;
Overload protection: 10A instant ceramic fuse.

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Note:

This function is suitable for 50Hz-1KHz frequency signal.

O. NCV measurement

The operation is as follows:

1. Turn the range switch to the 'NCV/Live' position (LCD displays 'ACV' in the unmeasured state).
2. The top of the multimeter device features an NCV detector. Whenever the device is within range of AC voltage the instrument will emit an uninterrupted tone, depending on voltage. The LCD screen will display different segments on the NCV icon according to the strength of the signal.



Note:

- A. When measuring NCV non-contact voltage, please unplug the test pen to avoid electric shock.
- B. Even if there is no indication, the voltage may still exist. Do not rely on non-contact voltage to determine whether there is a voltage in the conductor. Detection operation may be affected by factors such as insertion design, insulation thickness and other factors.
- C. Disturbance from external environment (such as camera flash, motor, etc.) may cause NCV alarm by mistake.

P. Diode and on-off test

Range	Display value	Test conditions
	The buzzer sounds continuously. The resistance of two points is less than (50+20) Ω	Open circuit voltage is about 1V, press SEL key to switch between two ranges.
	Diode forward voltage drop	The forward DC current is 1mA and the open circuit voltage is about 3.2V.

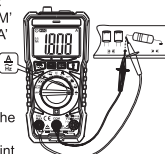
Specific operations as follows:

1. Insert the black pen into the 'COM' jack and the red pen into the 'VΩmA' jack (note that the red pen is '-').
2. Turn the range switch to the 'diode' position and connect the pen in parallel to two points of the circuit under test, if the built-in buzzer sounds continuously and the on-off indicator lights up, the resistance between the two points is less than (50+20) Ω.

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The specific operation is as follows:

1. Insert the black pen into the 'COM' jack and the red pen into the '10A' jack.
2. Turn the range switch to the corresponding '10A' position, then connect the instrument in series into the circuit to be tested, and the measured current value and the current polarity of the red pen point will be displayed on the screen at the same time.



Note:

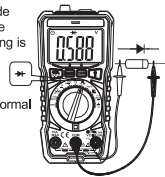
- a. Turn off the power supply in the return circuit before the instrument is connected in series to the return circuit to be tested.
- b. The maximum input current is (depending on where the red pen is inserted), excessive current will damage the fuse of the device. Do not connect the test pen in parallel to any circuit when measuring current, it will damage the fuse and the instrument.
- c. When the test pen is inserted on the current input port, do not connect the needle of the test pen in parallel to any circuit, it will damage the fuse and instrument.
- d. After completing all measurement operations, turn off the power supply of the circuit under test, and then break the connection between the test pen and the circuit under test, this is especially important when measuring large currents.
- e. Do not connect more than 36V DC or 25V AC voltage between current jack and 'COM' jack.

Q. Capacitance MDM-202

Range	Resolution	Accuracy
6nF	1pF	±5%reading±5digit
60nF	10pF	±3.0%reading±5digit
600nF	0.1nF	±3.0%reading±5digit
6μF	1nF	±3.0%reading±5digit
60μF	10nF	±3.0%reading±5digit
600μF	100nF	±3.0%reading±5digit
6mF	1μF	±3.5%reading±10digit
60mF	10μF	±3.5%reading±10digit

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3. Press the SEL button, select the diode measurement, connect the pen to the diode to be measured, and the reading is the approximate value of the forward voltage drop of the diode, for the silicon PN junction. Generally about 500~800mV is confirmed to be the normal value. If the measured diode is Open-Circuit or polar reversal, it will show 'OL'.



R. Resistance MDM-202

Range	Resolution	Accuracy
600 Ω	0.1 Ω	±0.8%reading±5digit
6k Ω	1 Ω	±0.8%reading±2digit
60k Ω	10 Ω	±0.8%reading±2digit
600k Ω	100 Ω	±0.8%reading±2digit
6M Ω	1k Ω	±0.8%reading±2digit
60M Ω	10k Ω	±3.0%reading±5digit

Open circuit voltage: less than 3V; Overload protection: 250V DC or 250V AC RMS.

S. Resistance MDM-203

Range	Resolution	Accuracy
999.9Ω	0.1 Ω	±0.8%reading±5digit
9.999k Ω	1 Ω	±0.8%reading±2digit
99.99k Ω	10 Ω	±0.8%reading±2digit
999.9k Ω	100 Ω	±0.8%reading±2digit
9.999M Ω	1k Ω	±0.8%reading±2digit
99.99M Ω	10k Ω	±3.0%reading±5digit

Open circuit voltage: less than 3V; Overload protection: 250V DC or 250V AC RMS.

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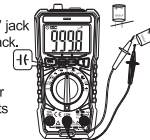
M. Capacitance MDM-203

Range	Resolution	Accuracy
9.999nF	1pF	±5%reading±10digit
99.99nF	10pF	±3%reading±10digit
999.9nF	0.1nF	±3%reading±10digit
9.999μF	1nF	±3%reading±10digit
99.99μF	10nF	±3%reading±10digit
999.9μF	100nF	±3%reading±10digit
9.999mF	1μF	±3.5%reading±10digit
99.99mF	10μF	±3.5%reading±10digit

Overload protection: 250V DC or AC RMS.

The specific operation is as follows:

1. Insert the black pen into the 'COM' jack and the red pen into the 'VΩHz' jack.
 2. Turn the range switch to the '4f' position and connect the test pen to both ends of the capacitor under test. Read the measurement results from the display.
- Note:
- a. When measuring capacitance with 9.999nF and 99.99nF, the screen display value may have residual reading, which is the distributed capacitance of the pen. It is an accurate reading and can be subtracted after measurement.
 - b. When measuring and verifying leakage or breakdown capacitance with large capacitance setting, some values will be displayed and unstable. When measuring large capacitance, the reading can take several seconds to be stabilise, which is normal when measuring large capacitance.
 - c. Before testing capacitance capacity, discharge capacitance sufficiently to prevent damage to fuse and instrument;
 - d. Unit 1F=1000mF, 1mF=1000F, 1F=1000nF, 1nF=1000pF.



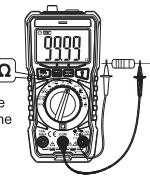
N. Frequency measurement

Range	Gear	Accuracy
9.999Hz~9.999MHz	Hz/%	±0.1%reading±5digit
9.999Hz~9.999KHz	V/A	±0.0%reading±5digit

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Specific operations as follows:

1. Insert the black pen into the 'COM' jack and the red pen into the 'VΩmA' jack.
2. Turn the range switch to the 'Ω' position.
3. Connect the pen in parallel to the measured resistance and read the measurement results from the display.



Automatic Shutdown & Cancel Automatic Shutdown

The instrument will automatically power off and enter a dormant state after 15 minutes of inactivity. If you want to restart the device press any key to wake up the instrument. To deactivate automatic shutdown, when in the OFF position, press the SEL key and at the same time turn the range switch to any other position. The screen symbol '⏻' will disappear, and the buzzer will sound 3 times to indicate automatic shutdown has been cancelled. If you need shutdown function, shut down and while in the OFF position turn on the power again.

Special Statement

- ▶ Used batteries must be handled in accordance with local laws and regulations.
- ▶ MATRIX reserves the right to update and modify the product design specifications and instruction manual without prior notice.



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