

DT-4000ZB

3 3/4 AUTO RANGE & AUTO POWER OFF DIGITAL MULTIMETER OPERATION MANUAL

This LCD Auto Range & Auto Power off digital multimeter is a portable, compact, 3 3/4 digits multimeter. It is ideally suited for field, lab, shop, car, and home applications.

1. SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS

Display : 3 3/4 digits LCD with a max. reading of 4000.
 Range control : Auto range control
 Polarity : Automatic negative polarity indication.
 Zero adjustment : Automatic.
 Overrange indication: The "OL" display.
 Lowbattery : The "BAT" is display when the battery voltage is below 2.4V.
 Auto Power Off : 30 minutes after stopping the switch or no key-input past, the meter automatically enters to power off mode.
 Safety standards : **CE EMC/LVD**. The meter is up to the standards of IEC1010 Pollution Degree 2, Overvoltage Category II.
 Operating environment: Temperature 32 to 104°F (0°C to 40°C), humidity < 85% RH.
 Storage environment: Temperature -4 to 140°F (-20°C to 60°C), humidity < 95% RH.
 Power : 2 x 1.5V AA batteries.
 Dimension : 145(H) x 73(W) x 40(D) mm
 Weight : Approx. 260g (including battery and holster).

1.2 ELECTRICAL SPECIFICATIONS

Accuracy is ± (% of reading + number in last digit) at 23 ± 5°C, <75% RH.

DC Voltage

400mV, 4V, 40V, 400V : ± (0.5% + 5)
 600V : ± (0.8% + 5)
 Impedance : 10MΩ

⚠ Max. voltage from "VΩmA" socket to "COM" socket is 600V $\sqrt{2}$, from "COM" socket to earth is 300V $\sqrt{2}$.

AC Voltage

4V, 40V, 400V : ± (0.8% + 5)
 400mV, 600V : ± (1.2% + 5)
 Impedance : 10MΩ
 Frequency response : 40—400Hz

Resistance

400Ω, 4kΩ, 40kΩ, 400kΩ, 4MΩ : ± (1% + 5)
 40MΩ : ± (2% + 5)
 Overload protection : 250V DC/AC RMS.

DC Current

40mA, 400mA : ± (1.5% + 5)
 10A : ± (2% + 5) ⚠ Caution: Maximal operation time 15s.
 Overload protection : Fast 0.5A/250V, 10A/250V fuse.

AC Current

40mA, 400mA : ± (2% + 5)
 10A : ± (2.5% + 5) ⚠ Caution: Maximal operation time 15s.

1

If the battery is weak, a "BAT" symbol will appear on the left of the display. It means that the battery should be replaced.

2.2 DC and AC Voltage measurement

- 1) Connect the black test lead to "COM" socket and red test leads to the "VΩmAHz" socket.
- 2) Set the selector switch to desired "V $\sqrt{2}$ " position, and press "SELECT" key to choose function.
- 3) Connect the probes across the source or load under measurement.

2.3 DC and AC Current measurement

- 1) Connect the black test lead to "COM" socket and red test leads to the "VΩmAHz" socket.
- 2) For measurement up to 400mA. Set the selector switch to desired "mA $\sqrt{2}$ " position, and press "SELECT" key to choose function.
- 3) For current measurement from 400mA to 10A, connect the red test lead to "10A" socket. Set selector switch to "A $\sqrt{2}$ " position, and press "SELECT" key to choose function.
- 4) Connect the probes across the source or load under measurement.

2.4 Resistance measurement and Diode, Continuity Test

- 1) Connect the black test lead to "COM" socket and red test leads to the "VΩmAHz" socket.
- 2) Set the selector switch to "Ω/H $\sqrt{2}$ /diode" position and press "SELECT" key to choose function.
- 3) Connect the probes across circuit to be tested.
 Caution: Ensure that the circuit to be tested is "dead". Max. input over-load: 250V RMS. and <10sec.

2.5 Capacitance measurement

- 1) Before testing, discharge the capacitor by shorting its leads together. Use caution in handling capacitors because they may have a charge on them of considerable power before discharging.
- 2) Connect the black test lead to "COM" socket and red test leads to the "VΩmAHz" socket.
- 3) Set the selector switch to "Ω/H $\sqrt{2}$ /diode" position and press "SELECT" key to "CAP" function.
- 4) Press "RELA" key, you can use the relative function to eliminate the zero error.
- 5) Connect the probes across capacitor to be tested.
 Note: When testing 200μF capacitor, note that there will be approx. 30 sec time lag.

2.6 Frequency and Duty cycle measurement

- 1) Connect the black test lead to "COM" socket and red test leads to the "VΩmAHz" socket.
- 2) Set the selector switch to "Hz" position and press "Hz/DUTY" key to choose function.
- 3) Connect the probes across the source or load under measurement.

2.7 Temperature measurement

Connect the K type thermocouple's black test lead to "COM" socket and red test lead to the "VΩmAHz" socket.
 Centigrade and Fahrenheit can be exchanged during the temperature measuring by selecting switch to the "°C" or "°F" range.

2.8 hFE Test

- 1) Set the selector switch to the "hFE" position.
- 2) Determine whether the transistor is NPN or PNP and locate the Emitter, Base and Collector leads. Insert the leads into the proper holes in the socket on the front panel.
- 3) The display will read the approximate hFE value.

2.9 Manual range and auto range

- 1) Default is set to be "Auto" range when the meter first turns on. Press "RANGE" key the meter enter the manual mode. Each presses of "RANGE" key increments the range.
- 2) Hz/Duty and Capacity and Temperature functions cannot be manually changed.
- 3) Press "RANGE" key more than 2 seconds, the meter changes back to "Auto".

3

Overload protection : Fast 0.5A/250V, 10A/250V fuse.
 Frequency response : 40—400Hz

Capacitance

4nF : ± (5% + 10)
 40nF : ± (3% + 10)
 400nF, 4μF, 40μF : ± (2% + 5)
 200μF : ± (4% + 5)
 Overload protection : 250V DC/AC RMS.

Frequency and Duty cycle

Frequency 10Hz-10MHz : ± (0.02% + 5)
 Duty cycle 0.1%-99.9% : ± (2% + 5) Frequency lower than 10kHz
 Sensitivity : Sine wave 0.6V RMS.
 Overload protection : 250V DC/AC RMS.

Temperature (Using K type thermocouple probe)

0°C—40°C (32°F—104°F) : ± 3°C (± 6°F) (Build-in temperature sensor)
 -50°C—+200°C (-58°F—+392°F) : ± 0.75%± 3°C (± 0.75%± 6°F)
 +200°C—+750°C (392°F—+1382°F) : ± 1.5%± 3°C (± 1.5%± 6°F)

Diode Test

Test current : 1±0.6mA Test voltage : Approx. 1.5V
 Overload protection : 250V DC/AC RMS

Continuity Test

Audible indication: less than 120Ω Approx.
 Overload protection : 250V DC/AC RMS.

hFE Test

I_b = 10μA V_{ce} = 2V Approx.
 Test range : 0 — 1000.

2. OPERATION

WARNING

- 1) When measuring voltage ensure that instrument is not connected or switched to resistance range. Always ensure that the correct terminals are used for the type of measurement to be made.
- 2) Use extreme care when measuring voltage above 50V, especially from sources where high energy is existed.
- 3) Avoid making connections to "live" circuits whenever possible.
- 4) When making current measurements ensure that the circuit not "live" before opening it in order to connect the test leads.
- 5) Before making resistance measurements or diode test, ensure that the circuit under test is de-energized.
- 6) Always ensure that the correct function and range is selected. If in doubt about the correct range to use, start with the highest and work downwards.
- 7) Extreme care should be taken when using the instrument to conjunction with a current transformer connected to the terminals if an open circuit occurs.
- 8) Ensure that the test leads and probes are in good condition with no damage to the insulation.
- 9) Take care not to exceed the over-load limits as given in the specifications.
- 10) Before opening the case of the instrument to replace battery, disconnect the test leads from any external circuit, set the selector switch to "OFF" position.

2.1 Check the 3-volt battery.

2

2.10 Relative value display

Press "RELA" key meter enter relative measurement mode, the present value will be stored in memory, new display value is equalled measurement value subtract stored value. All functions are with capability except for Hz/Duty function.

Example:

When you test the capacitance, you can use the relative function to eliminate the zero error.

2.11 Auto Power Off and disable

- 1) When the meter has been turned on 15 minutes without any action from the users, the meter will automatically change to "OFF" mode.
- 2) To disable Auto Power Off function, press "SELECT" key when power on the meter.

3. CARE AND MAINTENANCE

3.1 CARING FOR YOUR MULTIMETER

Your Digital MultiMate is an example of superior design and craftsmanship. The following suggestions will help you care for the millimeter so you can enjoy it for years.

- 1) Keep the millimeter dry. If it gets wet, wipe it dry immediately. Liquids can contain minerals that can corrode electronic circuits.
- 2) Use and store the millimeter only in normal temperature environments. Temperature extremes can shorten the life of electronic devices, damage batteries, and distort or melt plastic parts.
- 3) Handle the millimeter gently and carefully. Dropping it can damage the circuit boards and case and can cause the millimeter to work improperly although the holster can provide enough protection.
- 4) Keep the millimeter away from dust and dirt, which can cause premature wear of parts.
- 5) Wipe the millimeter with a damp cloth occasionally to keep it looking new. Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the millimeter.
- 6) Use only fresh batteries of the required size and type. Always remove old or weak batteries. They can leak chemicals that destroy electronic circuits.

3.2 MAINTENANCE

3-Volt battery replacement or fuse replacement

- a) Ensure the instrument is not connected to any external circuit. Set the selector switch to OFF position and remove the test leads from the terminals.
- b) Remove the screw on the bottom case and lift the bottom case. Remove the spent battery and replace it with a battery of the same type.
- c) Remove the screws on the bottom case and lift the case. Replace the fuse with same type and rating: 5x20mm 0.5A/250V fast-blow fuse or 6x25mm 10A/250V fast-blow fuse as the replacements.

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4