

DRAPER[®]

INSTRUCTIONS FOR Digital Multimeter

Stock No.78997 Part No.DMM6B

IMPORTANT: PLEASE READ THESE INSTRUCTIONS CAREFULLY TO ENSURE THE SAFE AND EFFECTIVE USE OF THIS PRODUCT.



WARNING:
Ensure rubber casing
does not interfere with
correct installation of
the test probes

CE

05/2005

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GENERAL INFORMATION

This manual has been compiled by Draper Tools and is an integrated part of the product with which it is enclosed and should be kept with it for future references.

This manual describes the purpose for which the product has been designed and contains all the necessary information to ensure its correct and safe use. We recommend that this manual is read before any operation or, before performing any kind of adjustment to the product and prior to any maintenance tasks. By following all the general safety instructions contained in this manual, it will ensure both product and operator safety, together with longer life of the product itself.

All photographs and drawings in this manual are supplied by Draper Tools to help illustrate the operation of the product.

Whilst every effort has been made to ensure accuracy of information contained in this manual, the Draper Tools policy of continuous improvement determines the right to make modifications without prior warning.



CONTENTS

Contents/Declaration 1
 Specification..... 2-4
 Guarantee/General Safety Instructions..... 5
 Getting to Know Your Multimeter.....6-7
 Operation and Use 8-13
 Battery Installation/Fuse Replacement 14



DECLARATION OF CONFORMITY

We :
 Draper Tools Ltd.,
 Hursley Road,
 Chandler's Ford,
 Eastleigh, Hampshire.
 SO53 1YF.
 England.

Declare under our sole responsibility that the product:

Stock No:- **78997.**
 Part No:- **DMM6B.**
 Description:- **Digital Multimeter.**

To which this declaration relates is in conformity with the following directive(s) 73/23/EEC, 89/336/EEC.

With reference to: EN61010-1:2001, EN61010-3-031:1994, EN61326:1997, EN55022, EN61000-4-2, EN61000-4-3.

J.N. Draper
 Managing Director

11/08/2004



SPECIFICATION

Stock No. 78997
 Part No. DMM6B
 Battery type..... 1x 9V PP3
 Dimensions..... 146(H) x 66.2(W) x 41.5(D) mm
 Weight.....200g

- **DC VOLTAGE (autoranging):** Input impedance 10M ,
 Overload protection 1000V DC or 750V AC RMS.

Range	Resolution	Accuracy
400mV	0.1 mV	±0.5% rdg ± 2 dgts
4V	1mV	±1.2% rdg ± 2 dgts
40V	10mV	
400V	100mV	
1000V	1V	±1.5% rdg ± 2 dgts

- **AC VOLTAGE (autoranging except 400mV):** Input impedance 10M ,
 Overload protection 1000V DC or 750V AC RMS, Frequency range: 50-400Hz.

Range	Resolution	Accuracy
400mV	0.1 mV	±1.5% rdg ± 30 dgts
4V	1mV	±1.2% rdg ± 3 dgts
40V	10mV	±1.5% rdg ± 3 dgts
400V	100mV	
750V	1V	±2.0% rdg ± 4 dgts

- **CURRENT (autoranging µA and mA):** Maximum Input: 400mA on µA/mA ranges,
 20A on 20A range, Overload protection: 0.5A/250V fuse: µA/mA range,
 10A/250V fuse: 10A range. AC frequency range: 50-400Hz.

Range	Resolution	DC Accuracy	AC Accuracy
400µA	0.1µA	±1.0% rdg ± 3 dgts	±1.5% rdg ± 5 dgts
4000µA	1µA	±1.5% rdg ± 3 dgts	±1.8% rdg ± 5 dgts
40mA	10µA		
400mA	100µA		
10A	10mA	±2.5% rdg ± 5 dgts	±3.0% rdg ± 7 dgts



SPECIFICATION

- **RESISTANCE (autoranging):** Overload protection: 250V DC or 250V AC RMS.

Range	Resolution	Accuracy
400	0.1	±1.2% rdg ± 4 dgts
4k	1	
40k	10	±1.2% rdg ± 2 dgts
400k	100	
4M	1k	
40M	10k	±2.0% rdg ± 3 dgts

- **DUTY CYCLE:** Pulse width: 100µs - 100ms, Frequency range: 5Hz-150kHz, sensitivity: <0.5V RMS, Overload protection: 250V DC or AC RMS

Range	Resolution	Accuracy
0.1 to 99.9%	0.1%	±1.2% rdg ± 2 dgts

- **FREQUENCY (autoranging):** Sensitivity: >5V RMS min, Overload protection: 250V DC or 250V AC RMS

Range	Resolution	Accuracy
9Hz	0.001Hz	±1.5% rdg ± 5 dgts
99Hz	0.01Hz	
999Hz	0.1Hz	±1.2% rdg ± 3 dgts
9kHz	1Hz	
99kHz	10Hz	
999kHz	100Hz	
9MHz	1kHz	±1.5% rdg ± 4 dgts

- **TEMPERATURE:** Sensor: Type K thermocouple, Overload protection: 250V DC or 250V AC RMS

Range	Resolution	Accuracy
-20 to 760°C	1°C	±3.0% rdg ± 3 dgts
-4 to 1400°F	1°F	



SPECIFICATION

- **CAPACITANCE (autoranging):** Overload protection: 250V DC or 250V AC RMS.

Range	Resolution	Accuracy
4nF	1pF	±5.0% rdg ± 20 dgts
40nF	10pF	±5.0% rdg ± 7 dgts
400nF	0.1nF	±3.0% rdg ± 5 dgts
4µF	1nF	
40µF	10nF	
200µF	0.1µF	±5.0% rdg ± 5 dgts

- **DIODE CHECK:** Test current: 0.3mA typical, Overload protection: 250V DC or 250V AC RMS.

Open Circuit Voltage	Resolution	Accuracy
1.5V DC Typical	1mV	±10.0% rdg ± 5 dgts

- **AUDIBLE CONTINUITY:** Overload protection: 250V DC or 250V AC RMS.

Audible Threshold	Resolution	Test Current
<50	~	<0.3mA

reading - accuracy of the measurement circuit.

digits - accuracy of the analog to digital conversion.

- **WARNING: Ensure the test leads are fully engaged prior to carrying out any measurements to avoid electric shock.**

Draper tools have been carefully tested and inspected before shipment and are guaranteed to be free from defective materials and workmanship for a period of 12 months from the date purchase except where the tools are hired out when the guarantee period is ninety days from the date of purchase.

Should the tool develop a fault, please return the complete tool to your nearest authorised warranty repair agent or contact Draper Tools Limited, Chandler's Ford, Eastleigh, Hampshire, SO53 1YF, England. Telephone: (023) 8026 6355.

If upon inspection it is found that the fault occurring is due to defective materials or workmanship, repairs will be carried out free of charge. This guarantee does not apply to normal wear and tear, nor does it cover any damage caused by misuse, careless or unsafe handling, alterations, accidents, or repairs attempted or made by any personnel other than the authorised Draper warranty repair agent.

This guarantee applies in lieu of any other guarantee expressed or implied and variations of its terms are not authorised.

Your Draper guarantee is not effective unless you can produce upon request a dated receipt or invoice to verify your proof of purchase within the 12 month period.

Please note that this guarantee is an additional benefit and does not affect your statutory rights.

Draper Tools Limited.

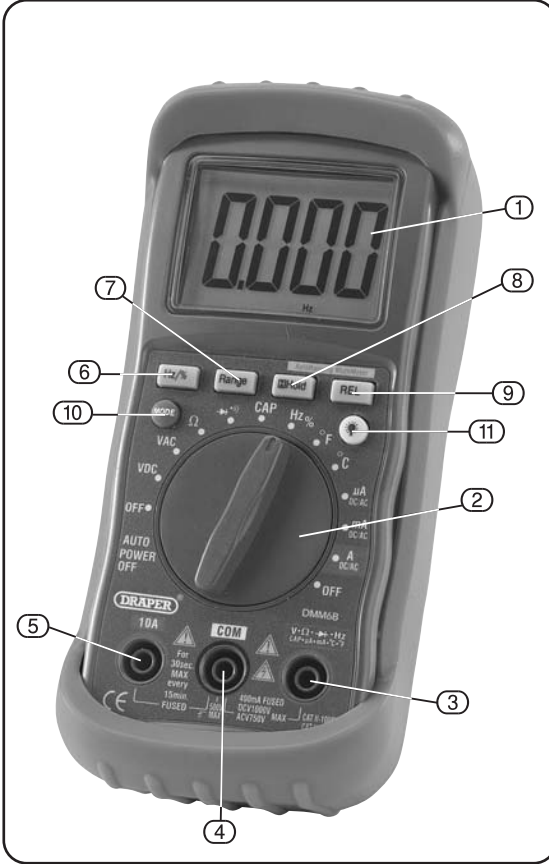
SAFETY INFORMATION:

The following safety information must be observed to insure maximum personal safety during the operation of this meter.

- Do not use the meter if the meter or test leads look damaged, or if you suspect that the meter is not operating correctly.
- Never ground yourself when taking electrical measurements. Do not touch exposed metal pipes, outlets, fixtures, etc. which might be at ground potential. Keep your body isolated from ground by using dry clothing, rubber shoes, rubber mats, or any approved insulating material.
- Turn off power to the circuit under test before cutting, unsoldering, or breaking the circuit. Small amounts of current can be dangerous.
- Use caution when working above 60Volts DC or 30Volts AC, as these voltages pose a shock hazard.
- When using probes, keep your fingers behind the finger guards on the probes.
- Measuring voltage which exceeds the limits of the multimeter may damage the meter and expose the operator to a shock hazard. Always recognize the meter voltage as stated on the front of the meter.
- Never apply voltage or current to the meter that exceeds the specified maximum.



GETTING TO KNOW YOUR MULTIMETER













- ① Liquid crystal display.
- ② Function switch.
- ③ V, Ω , \rightarrow Hz, CAP, μ A, mA, °C, °F (Voltage, Resistance, Diode Check, Hertz, Capacitance, Microamps, Milliamps, Temperature) jack socket. Plug in the red (positive) test lead.
- ④ COM jack socket. Plug in the black (negative) test lead.
- ⑤ 10A jack socket. Plug in the red (positive) test lead for measuring amperage to a maximum of 10A.
- ⑥ Frequency/Duty cycle button.
- ⑦ Range button.
- ⑧ Data hold button.
- ⑨ Relative button. Stores a value. All subsequent measurements display the difference between the reference value and measured value.
- ⑩ Mode button. To select Diode/Continuity or select DC/AC current.
- ⑪ Back light button.

- **UNPACKING:** After removing the packing material, make sure the product is in perfect condition and that there are no visible damaged parts. If in doubt, do not use the multimeter and contact the dealer from whom it was purchased.

The packaging materials (plastic bags, polystyrene, etc.), must be disposed of in an appropriate refuse collection container. These materials must not be left within the reach of children as they are potential sources of danger.

- OTHER METER MARKINGS

	Diode Check		Caution, risk of electric shock.
	Indicates that the meter battery voltage has dropped excessively.		Audible continuity range.
$10A$  mA  μA 	Units of measuring current (AMPS).	Hz	Units of measuring frequency (Hertz).
V  V 	Units of measuring voltage (VOLTS).	CAP	Units of measuring capacitance (pF: picofarads, nF: nanofarads and μF : microfarads).
Ω	Units of measuring resistance (OHMS).	$^{\circ}F/^{\circ}C$	Units of measuring temperature (Fahrenheit and Celsius).
	Caution.	%	Units of measuring duty cycle.

WARNING: Each time you use this instrument, inspect the test leads, connectors and probes for damage, e.g. cracks or breaks in the insulation. Any defective leads should be replaced. If the voltage to be measured is not known and the meter is not autoranging, set the selector switch to the highest range and reduce until a satisfactory reading is obtained. Always ensure that the probe plugs are inserted fully into the multimeter. If at any point you are uncertain what you are doing, please contact a qualified electrician.

WARNING: Risk of electrocution. High-voltage circuits, both AC and DC, are very dangerous and should be measured with great care.

1. ALWAYS turn the function switch to the OFF position when the meter is not in use. The meter has Auto OFF that automatically shuts the meter OFF if 15 minutes elapses between uses.
2. If "OL" appears in the display during a measurement, the value exceeds the range you have selected. Change to a higher range.

NOTE: On some low AC and DC voltage ranges, with the test leads not connected to a device, the display may show a random, changing reading. This is normal and is caused by the high-input sensitivity. The reading will stabilise and give a proper measurement when connected to a circuit.

- **MODE BUTTON:**

To select Diode/Continuity or DC/AC current.

- **RANGE BUTTON:**

When the meter is first turned on, it automatically goes into AutoRanging. This automatically selects the best range for the measurements being taken and is generally the best mode for most measurements. For measurement situations requiring that a range be manually selected, perform the following:

1. Press the RANGE button. The 'AUTO' display indicator will turn off.
2. Press the RANGE button to step through the available ranges until you select the range you want.
3. Press and hold the RANGE button for 2 seconds to exit the Manual Ranging mode and return to AutoRanging. (If the backlight is turned on, press BACKLIGHT button to switch off).

- **DATA HOLD BUTTON:**

The Data Hold function allows the meter to "freeze" a measurement for later reference.

1. Press the DATA HOLD button to "freeze" the reading on the indicator. The indicator "HOLD" will appear in the display.
2. Press the DATA HOLD button to return to normal operation.

- **BACKLIGHT BUTTON:**

1. Press the BACKLIGHT button for 2 seconds to switch the display light ON.
2. Press BACKLIGHT button again to exit the light mode.

- **DC Voltage Measurements:**

Caution: Do not measure DC voltages if a motor on the circuit is being switched ON or OFF. Large voltage surges may occur that can damage the meter.

1. Set the function switch to the V DC position ("mV" will appear in the display).
2. Insert the black test lead banana plug into the negative (COM) jack and the red test lead banana jack into the positive (V) jack.
3. Touch the test probe tips to the circuit under test. Be sure to observe the correct polarity (red lead to positive, black lead to negative).
4. Read the voltage in the display. The display will indicate the proper decimal point and value. If the polarity is reversed, the display will show (-) minus before the value.

- **AC Voltage measurements:**

WARNING: Risk of electrocution. The probe tips may not be long enough to contact the live parts inside some 240V outlets for appliances because the contacts are recessed deep in the outlets. As a result, the reading may show 0 volts when the outlet actually has voltage on it. Make sure the probe tips are touching the metal contacts inside the outlet before assuming that no voltage is present.

1. Set the function switch to the V AC position.
2. Insert the black test lead banana plug into the negative (COM) jack and the red test lead banana jack into the positive (V) jack.
3. Touch the test probe tips to the circuit under test.
4. Read the voltage in the display. The display will indicate the proper decimal point, value and symbol (AC, V, etc.).

- **DC Current Measurements:**

Caution: Do not make current measurements on the 10A scale for longer than 30 seconds. Exceeding 30 seconds may cause damage to the meter and/or test leads.

1. Insert the black test lead banana plug into the negative (COM) jack.
2. For current measurements up to 4000 μ A DC, set the function switch to the μ A position and insert the red test lead banana plug into the (μ A) jack.
3. For current measurements up to 400mA DC, set the function switch to the mA range and insert the red test lead banana plug into the (mA) jack.
4. For current measurements up to 10A DC, set the function switch to the A position and insert the red test lead banana plug into the 10A jack.
5. Press the AC/DC button until "DC" appears in the display.
6. Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
7. Touch the black test probe tip to the negative side of the circuit. Touch the red test probe tip to the positive side of the circuit.
8. Apply power to the circuit.
9. Read the current on the display. The display will indicate the proper decimal point, value and symbol.

- **AC Current Measurements:**

WARNING: To avoid electric shock, do not measure AC current on any circuit whose voltage exceeds 250V AC.

1. Insert the black test lead banana plug into the negative (COM) jack.
2. For current measurements up to 4000 μ A AC, set the function switch to the μ A position and insert the red test lead banana plug into the (μ A) jack.
3. For current measurements up to 400mA AC, set the function switch to the mA range and insert the red test lead banana plug into the (mA) jack.
4. For current measurements up to 10A AC, set the function switch to the A position and insert the red test lead banana plug into the (10A) jack.
5. Press the AC/DC button until "AC" appears in the display.
6. Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
7. Touch the black test probe tip to the negative side of the circuit. Touch the red test probe tip to the positive side of the circuit.
8. Apply power to the circuit.
9. Read the current on the display. The display will indicate the proper decimal point, value and symbol.

- Resistance Measurements:

WARNING: To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements. Remove the batteries and unplug the line cords.

1. Set the function switch to the $\rightarrow \vdash \bullet$ position.
2. Insert the black test lead banana plug into the negative (COM) jack and the red test lead banana plug into the positive \vdash jack.
3. Touch the test probe tips across the circuit or part under test. It is best to disconnect one side of the part under test so the rest of the circuit will not interfere with the resistance reading.
4. Read the resistance in the display. The display will indicate the proper decimal point, value and symbol.

- Continuity Check:

WARNING: To avoid electric shock, never measure continuity on circuits or wires that have voltage on them.

1. Set the function switch to the $\rightarrow \vdash \bullet$ position.
2. Insert the black test lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the positive (+) jack (\vdash).
3. Press the $\rightarrow \vdash \bullet$ button until the \bullet symbol appears in the display.
4. Touch the test probe tips to the circuit or wire you wish to check.
5. If the resistance is less than approximately 30 Ω , the audible signal will sound. The display will also show the actual resistance.

- Diode Test:

WARNING: To avoid electric shock, do not test any diode that has voltage on it.

1. Set the function switch to the $\rightarrow \vdash \bullet$ position.
2. Press the $\rightarrow \vdash \bullet$ button until the $\rightarrow \vdash$ symbol appears in the display.
3. Insert the black test lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the positive (+) jack (\vdash).
4. Touch the test probe tips to the diode or semiconductor junction you wish to test. Note the meter reading.
5. Reverse the probe polarity by switching probe position. Note this reading.
6. The diode or junction can be evaluated as follows:
 - A. If one reading shows a value and the other reading shows OL, the diode is good.
 - B. If both readings show OL, the device is open.
 - C. If both readings are very small or 0, the device is shorted.

NOTE: The value indicated in the display during the diode check is the forward voltage.

- Frequency Measurement:

1. Set the function switch to the FREQ position.
2. Insert the black test lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the positive (+) jack (F).
3. Touch the test probe tips to the circuit under test.
4. Read the frequency in the display. The digital reading will indicate the proper decimal point, symbols (Hz, kHz) and value.

- Capacitance Measurements:

WARNING: To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any capacitance measurements. Remove the batteries and unplug the line cords.

1. Set the function switch to the "CAP" position. ("nF" and a small value will appear in the display).
2. Insert the black test lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the positive (+) jack (CAP).
3. Touch the test leads to the capacitor to be tested. The display will indicate the proper decimal point, value and symbol.

- Temperature Measurements:

WARNING: To avoid electric shock, disconnect both test probes from any source of voltage before making a temperature measurement.

1. If you wish to measure temperature in °F set the function switch to the °F range. If you wish to measure temperature in °C, set the function switch to the °C range.
2. Insert the temperature probe into the negative (-) jack (COM) and the positive (+) jack (Temperature), making sure to observe the correct polarity.
3. Touch the Temperature Probe head to the part whose temperature you wish to measure. Keep the probe touching the part under test until the reading stabilizes (about 30 seconds).
4. Read the temperature in the display. The digital reading will indicate the proper decimal point and value.



OPERATION AND USE

- Frequency or Duty Cycle Measurements:

1. Insert the black test lead banana plug into the negative (COM) jack and the red test lead banana jack into the positive Hz jack.
2. Turn the rotary switch to the Hz/% duty position.
3. Press the Hz/% button to select "Hz" or "%".
4. Touch the test probes to the circuit under test and read the frequency or duty cycle on the display.

Note: Duty cycle is the percentage of time a voltage is positive or negative.

Range (DC/AC)	Sensitivity	Frequency Width
4V	1.5V rms	5Hz~10kHz
40V, 400V	6.5V rms	5Hz~20kHz
	12V rms	5Hz~200kHz
1000V/750V	420V rms	50Hz~1 kHz
400mA	45mA rms	5Hz~5kHz
10A	4A rms	5Hz~1 kHz

Note: The above data is only for reference.

MAINTENANCE

The fuse rarely needs replacing, and almost always a blown fuse is the result of an operator error.

- **WARNING: If the resistance to be measured is part of a circuit, turn off and disconnect the power and discharge all capacitors before measurement.**

If the meter battery is in need of replacement  will appear on the display.

BATTERY INSTALLATION

- **WARNING: To avoid electric shock, disconnect the test leads from any source of voltage before opening the casing.**

1. Disconnect the test leads from the meter.
2. Open the casing by loosening the screws at the rear.
3. Open the casing gently, taking care not to damage the meter.
4. Insert the battery into the holder, observing the correct polarity.
5. Close and resecure the casing.

- **WARNING: To avoid electric shock, do not operate the meter until the casing is in place and fastened securely.**

- **Note:** If your meter does not function correctly, check the fuse and battery to ensure they are properly installed.

FUSE REPLACEMENT

WARNING: To avoid electric shock, disconnect the test leads from any source of voltage before opening the casing.

1. Disconnect the test leads from the meter.
2. Open the casing by loosening the screws at the rear.
3. Open the casing gently, taking care not to damage the meter.
4. Install the new fuse, ensuring the correct type and that the value matches the blown fuse.
5. Close and resecure the casing.

WARNING: To avoid electric shock, do not operate the meter until the casing is in place and fastened securely.

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