



400 SERIES MULTIMETER

41823, 41824.



IMPORTANT: Please read these instructions carefully to ensure the safe and effective use of this product and save these instructions for future reference. 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.

1. TITLE PAGE

1.1 INTRODUCTION:

USER MANUAL FOR:

SERIES 400 MULTIMETER

Stock no. 41823, 41824.

Part no. DMM400, DMM401.

1.2 REVISIONS:

Date first published April 2017

As our user manuals are continually updated, users should make sure that they use the very latest version.

Downloads are available from: <http://www.drapertools.com/manuals>

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1.3 UNDERSTANDING THIS MANUALS SAFETY CONTENT:

WARNING! Information that draws attention to the risk of injury or death.

CAUTION! Information that draws attention to the risk of damage to the product or surroundings.

1.4 COPYRIGHT © NOTICE:

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3. GUARANTEE

3.1 GUARANTEE

Draper tools have been carefully tested and inspected before shipment and are guaranteed to be free from defective materials and workmanship.

Should the tool develop a fault, please return the complete tool to your nearest distributor or contact Draper Tools Limited, Chandler's Ford, Eastleigh, Hampshire, SO53 1YF. England.

Telephone Sales Desk: (023) 8049 4333 or Product Helpline (023) 8049 4344.

A proof of purchase must be provided with the tool.

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 period covering parts/labour is 12 months from the date of purchase except where tools are hired out when the guarantee period is 90 days from the date of purchase. 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.

Note: If the tool is found not to be within the terms of warranty, repairs and carriage charges will be quoted and made accordingly.

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 guarantee period.

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

Draper Tools Limited.

4.1 GENERAL SPECIFICATIONS


Display mode: liquid crystal display (LCD).

Maximum display: 5999, 3 5/6 automatic polarity display and unit display.

Measurement methods: double integral A/D conversion.

Sampling rate: about 3 times per second.

Over range display: display "OL".

Low battery display: "  " symbol appears.

Work environment: 0 ~ 40 °C, relative humidity < 80%.

Storage condition: - 10 ~ 50 °C, relative humidity of < 80%.

Battery: 6F22 9V battery.

Size: 190mm×90mm×55mm (length x width x height).

Weight : about 403g (include battery).

DC Voltage

Range	Accuracy	Resolution
600mV	$\pm (0.5\% \text{ of rdg} + 5 \text{ digits})$	0.1mV
6V		1mV
60V		10mV
600V		100mV
1000V	$\pm (1.0\% \text{ of rdg} + 6 \text{ digits})$	1V

Input impedance: 10M Ω

Overload protection:

A) DC in mV or 250V AC peak

B) 1000V DC or 750V AC peak.

AC Voltage

Range	Accuracy	Resolution
600mV	$\pm (1.2\% \text{ rdg} + 5 \text{ digits})$	0.1mV
6V		1mV
60V		10mV
600V		100mV
750V	$\pm (1.5\% \text{ rdg} + 5 \text{ digits})$	1V

Input impedance: 10M Ω .

Overload protection: 1000V DC or 750V AC peak.

Frequency response: 40 ~ 1000Hz.

Display: True RMS (sine wave RMS calibration); Duty cycle display: (10.0% -90.0%).

4. INTRODUCTION

DC Current

Range	Accuracy	Resolution
60uA	$\pm (0.8\% \text{ rdg} + 10 \text{ digits})$	0.01uA
6mA		1uA
60mA		10uA
600mA	$\pm (1.2\% \text{ rdg} + 10 \text{ digits})$	100uA
20A	$\pm (2.0\% \text{ rdg} + 10 \text{ digits})$	10mA

Maximum input current: mA range: 600mA DC or AC rms.

20A range: 20A DC or AC rms.

Overload protection: 0.63A / 1000V fuse; 20A / 1000V fuse.

AC Current

Range	Accuracy	Resolution
6mA	$\pm (1.0\% \text{ rdg} + 10 \text{ digits})$	1.0uA
60mA		10uA
600mA	$\pm (1.5\% \text{ rdg} + 10 \text{ digits})$	100uA
20A	$\pm (2.5\% \text{ rdg} + 10 \text{ digits})$	10mA

Maximum input current: mA: 600mA DC or AC rms. 20A range: 20A DC or AC rms.

Overload protection: 0.63A / 1000V fuse; 20A / 1000V fuse.

Frequency response: 40 ~ 1000Hz.

Display: True RMS (sine wave RMS calibration);

Duty cycle: (10.0% -90.0%).

Resistance


Range	Accuracy	Resolution
600Ω	$\pm(0.8\% \text{ rdg} + 10 \text{ digits})$	0.1Ω
6kΩ	$\pm(0.8\% \text{ rdg} + 3 \text{ digits})$	1Ω
60kΩ		10Ω
600kΩ		100Ω
6MΩ		1kΩ
60MΩ	$\pm(1.2\% \text{ rdg} + 10 \text{ digits})$	10kΩ
200MΩ		100kΩ

Open circuit voltage: about 1.0V.

Overload protection: 250V DC or AC peak.


4. INTRODUCTION

Diode

Range	Display	Test condition
	Positive voltage	Positive DC current about 1.0mA, Reverse voltage 3.0V.

Overload protection : 250V DC current or AC current peak value.

Continuity Test

Range	Function	Test condition
	When the buzzer sounds long, the resistance of the two points is less than 50Ω.	Open-circuit voltage 1.0V.

Overload protection : 250V DC current or AC current peak value.

Capacitance

Range	Accuracy	Resolution
10nF	$\pm(4.0\% \text{ rdg} + 10 \text{ digit})$	0.001nF
100nF	$\pm(3.0\% \text{ rdg} + 5 \text{ digit})$	0.01nF
1μF		0.1nF
10μF		10nF
100μF		10nF
10000μF	Not calibrated	100nF

Overload protection : 250V DC current or AC current peak value.

Frequency

Range	Accuracy	Resolution
100Hz	$\pm(0.5\% \text{ rdg} + 3 \text{ digit})$	0.1Hz
1000Hz		1Hz
10kHz		10Hz
100kHz		100Hz
1MHz		1kHz
10MHz		10kHz

Input Sensitivity: 2.0V.

Overload protection: 250V DC or AC peak. Duty cycle display: (10.0% -90.0%)

Duty cycle

Range	Accuracy	Resolution
10.0% - 90.0%	$\pm(0.5\% \text{ rdg} + 3 \text{ digit})$	0.1%

4. INTRODUCTION

Temperature Measurement

Range	Accuracy	Resolution
0°C – 300°C	±(1.0%+4d)	1°C
301°C – 1000°C	±(1.9%+5d)	1°C
32°F – 600°F	±(1.2%+6d)	1°F
601°F – 1832°F	±(1.9%+6d)	1°F

4.2 HANDLING & STORAGE

Care must still be taken when handling, dropping this machine will have an effect on the accuracy.

The environment will have a negative result on its operation if you are not careful. If the air is damp, components will rust. If the machine is unprotected from dust and debris; components will become clogged.

5. HEALTH & SAFETY INFORMATION


5.1 SAFETY PRECAUTIONS

This instrument complies with IEC1010 (International Electrotechnical Commission promulgated safety standards). Design and production using the pollution level 2 safety requirements.

Warning

To avoid electrical shock or personal injury.
Please read the safety information and “warnings and precautions” before use.

Warning: When measuring voltage above 30V, current above 10ma, AC power with an inductive load. Use caution not to touch exposed contacts due to the risk of electric shock, only use approved probes or clamps.

1. Before measuring, check whether the measurement function switch is in the correct position, check whether the test probe is connected correctly to avoid electric shock.
2. The meter is only to be used in conjunction with the supplied test leads to comply with safety standards. If the test leads are broken or damaged, replace the test leads of the same type or the same electrical specifications.
3. Do not use an unapproved fuse to replace the fuse inside the meter. Only replace with the same model or the same specifications of the fuse. Before changing, remove the test leads to ensure that there is no signal input.
4. Do not use unapproved batteries to replace the battery inside the meter. Replace only with the same model or the same electrical specifications of the battery. Before changing, remove the test leads to ensure that there is no signal input.
5. During electrical measurements, the body must not be directly in contact with the earth, use insulating materials to keep your body insulated from the earth.
6. Do not store or use in high temperature, high humidity, flammable, explosive and strong magnetic field environments.
7. Measurements exceeding the limit values of the instrument may damage the instrument and endanger the safety of the operator.
8. Do not attempt to calibrate or service the instrument.
9. When the LCD shows “”, please replace the battery.
10. Do not insert the test leads to be inserted into the current terminals to measure the voltage!

6. IDENTIFICATION



① LCD display window.

② Function buttons.

③ Measurement function range switch.

④ Probe sockets.

6. IDENTIFICATION

6.1 FUNCTION BUTTONS 41823 & 41824 - FIG. 1

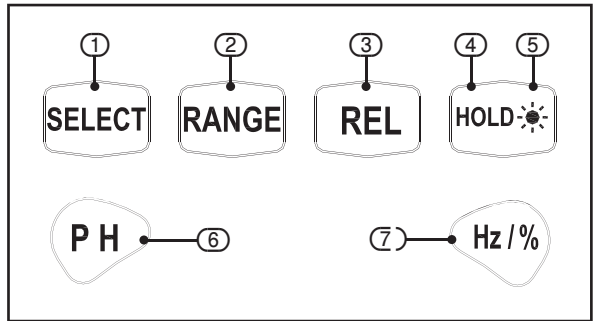


FIG.1

① SELECT

Press the "SELECT" button to switch between measurement modes.

② RANGE - 41824 ONLY

The meters default is auto ranging.

Press the "RANGE" button to switch to a manual ranging function.

③ REL (Relative Value Measurement) MANUAL MODE ONLY.

During measuring press the "REL" button, the current value will be stored in the metres memory and the "▲" symbol will appear on the meters screen. The meter will then automatically subtract the stored value from all future values and display the difference. Press the "REL" button again to switch back to Auto mode.

Note: Relative value measurement is not applicable when in Ω , $\mu\Omega$, $\text{m}\Omega$, Hz , $\%$ mode.

④ HOLD

During measuring press the "HOLD" button, the H symbol will appear on the screen and the current value will be held, press the "HOLD" button again to return to normal measuring mode.

⑤ BACK LIGHT

Press and hold the "☀" button for approx. 2 seconds to turn the back light on, the back light will stay on for approx. 30 seconds, to turn the back light off before this press and hold the "☀" button for approx. 2 seconds.

⑥ PEAK HOLD - 41824 ONLY

When pressing the "PH" button the meter will switch to manual mode automatically and will display the peak value.

⑦ HZ%

Press the "Hz%" button to switch between voltage, current, frequency and duty cycle.

Note: Hz% is not applicable when in Ω , $\mu\Omega$, $\text{m}\Omega$, Hz , and temperature mode.

6. IDENTIFICATION

6.2 LCD - FIG. 2



FIG.2

Symbolic	Description
AUTO	Auto Range
DC	DC current
AC	AC current
	Diode, Continuity Buzzer
PH	Peak - Hold
	Automatic Shut Off
	Low Battery Display
°C / °F	°C / °F Temperature
H	Hold Reading
%	Duty Ratio
mV, V	mV, V
uA, mA, A	uA, mA, A
nF, μF, mF	nF, μF, mF
Ω, kΩ, MΩ	Ω, kΩ, MΩ
Hz, kHz, MHZ	Hz, kHz, MHZ
	Relative Measurement Mode

7. UNPACKING & CHECKING

7.1 PACKAGING

Carefully remove the product from the packaging and examine it for any sign of damage caused during shipping. Lay the contents out and check them. If any part is damaged or missing, do not attempt to use the tool and contact the Draper Helpline immediately (see back page for details).

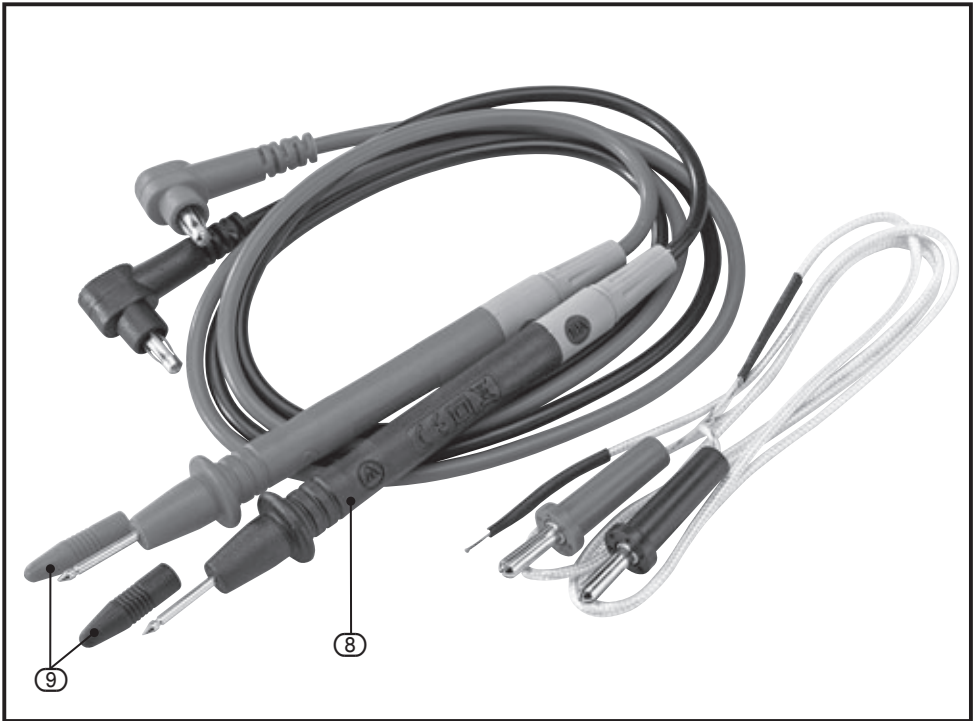
Retain the packaging material at least during the guarantee period: in case the machine needs to be returned for repair.

Warning! Some of the packaging materials used may be harmful to children, keep them out of reach from children.

Disposed of any packaging correctly and according to local regulations.

7.2 WHAT'S IN THE BOX?

As well as the product; there are several parts not fitted or attached to it.



⑧ Test probe

⑩ Temperature probe

⑨ Test probe caps

8. OPERATING INSTRUCTIONS

8.1. AUTOMATIC POWER OFF

If the meter is not used for approx. 15 minutes the meter will automatically switch off. The buzzer will sound approx. 1 minute before.

8.2. DC VOLTAGE

41823 DC voltage has five ranges, 600.0mV, 6.000V, 60.00V, 600.0V, 1000V.

41824 DC voltage is an automatic range, press the SELECT button to select the DC voltage function.

1. Connect the black test lead to the "COM" probe socket and the red to VΩHz probe socket.
2. Set the measurement function range switch to the DC voltage function.

⚠ Note:

Do not measure voltages higher than 1000 VDC or 750 VAC.

8.3. AC VOLTAGE

41823 AC voltage has five ranges, 600.0mV, 6.000V, 60.00V, 600.0V, 1000V.

41824 AC voltage is an automatic range, press the SELECT button to select the AC voltage function.

1. Connect the black test lead to the "COM" probe socket and the red to VΩHz probe socket.
2. Set the measurement function range switch to the AC voltage function.

⚠ Note:

Do not measure voltages higher than 1000 VDC or 750 VAC.

8.4. DC CURRENT

41823 DC current has five ranges, 60.00uA, 6.000mA, 60.00mA, 600.0mA, 20A.

41824 AC voltage is an automatic range, uA, mA, A. Press the SELECT button to select the DC current function.

1. Connect the black test lead into the "COM" probe socket. If the input current is less than 600mA connect the red test lead to the test lead to the uAmA probe socket. If the current is higher than 600mA connect the red test lead to the 20A probe socket.

⚠ Note:

If "OL" is displayed on the display, the measured current has exceeded the current range. Select a higher range.

8. OPERATING INSTRUCTIONS

8.5. AC CURRENT

41823 AC current has four range, 6.000mA, 60.00mA, 600.0mA, 20A.

41824 AC voltage is an automatic range, μ A, mA, A.

Press the SELECT button to select the AC current function.

1. Connect the black test lead to the "COM" probe socket. If the input current is less than 600mA connect the red test lead to the test lead to the μ AmA probe socket. If the current is higher than 600mA connect the red test lead to the 20A probe socket.

⚠ Note:

If "OL" is displayed on the display, the measured current has exceeded the current range. Select a higher range.

8.6. RESISTANCE (Ω)

The 41823 has six ranges: 600.0 Ω , 6.000k Ω , 60.00k Ω , 600.0k Ω , 6.000M Ω , 60.00M Ω and 200.0M Ω respectively.

The 41824 resistor is an automatic range up to 60 M Ω .

1. Connect the black test lead to the "COM" probe socket and the red to V Ω Hz probe socket.
2. Set the measurement function range switch to the DC voltage function.
3. Note: If "OL" is displayed on the display to indicate that the current range has been exceeded, select a higher range to complete.

⚠ Note:

- A) When measuring the resistance, ensure all the power is switched off, and all the capacitors should be fully discharged.
- B) In the high-resistance range, it takes a few seconds for a stable reading. This is normal for high-resistance measurements.

8.7. DIODE TEST

1. Connect the black test lead to the "COM" probe socket and the red to V Ω Hz probe socket to diode \rightarrow . Press the SELECT button to select the diode position (for 41824, select resistance and press the SELECT button to select the diode).
2. Set the measurement function range switch to the \rightarrow mode.
Read the result from the display.

⚠ Note:

When checking the diode, switch off all power and all capacitors should be fully discharged.

8. OPERATING INSTRUCTIONS

8.8 CONTINUITY TEST

1. Connect the black test lead to the "COM" probe socket and the red to V Ω Hz probe socket to continuity test \rightarrow press the SELECT key to select the \rightarrow (for 41824, select resistance and press the SELECT key to select \rightarrow).
2. Set the measurement function range switch to the \rightarrow mode.

8.9. CAPACITANCE (C)

1. Connect the black test lead to the "COM" probe socket and the red to V Ω Hz probe socket capacitor (test \rightarrow). Press the "SELECT" key to select the capacitance range (nF)
2. Set the measurement function range switch to the \rightarrow mode.
3. If "OL" is displayed, the measured capacitance value has exceeded the current range or the capacitor is short-circuited.

\triangle Note:

- A) When measuring the capacitance, all the power must be disconnected from the circuit under test and all the capacitors should be fully discharged.

8.10 FREQUENCY AND DUTY CYCLE (HZ%) MEASUREMENT


1. Connect the black test lead to the "COM" probe socket and the red to V Ω Hz probe socket.
2. Set the measurement function range switch to the frequency and duty cycle Hz%.
3. During frequency measurement, press "Hz /%" key to enter the duty measurement mode, press "Hz /%" again to return to the frequency measurement mode.
4. Press "Hz /%" key to enter the frequency measurement, press "Hz /%" key to enter the duty cycle measurement, press "Hz /%" key again to return to the original measurement status.

8.11. TEMPERATURE MEASUREMENT

1. Connect the black test lead to the "COM" probe socket and the red to V Ω Hz probe socket temperature range ($^{\circ}$ C/ $^{\circ}$ F).
2. Insert the input of the temperature probe into the "COM" and "V Ω Hz" holes and the positive terminal (red) into the "V Ω Hz", the sensing tip of the temperature probe is placed on the surface of the object to be measured.
3. Read the current measurement from the display.
4. Press SELECT to select between Fahrenheit, and Celsius.

9.1 BATTERY REPLACEMENT

Before attempting to open the battery cover or case, make sure that the test leads have been disconnected from the meter.

1. If “” appears on the LCD display, it indicates that the battery should be replaced.
2. Loosen the screw fixing the battery cover and remove it.
3. Replace the used battery with a new one.
4. Refit the battery cover.

9.2 TEST LEADS REPLACEMENT
























WARNING

Full in compliance with safety standards can be guaranteed only if used with test leads supplied. If necessary, they must be replaced with the same model or same electric ratings.

Electric ratings of the test leads: 1000V 10A.

10. EXPLANATION OF SYMBOLS

10.1 EXPLANATION OF SYMBOLS

	WEEE Do not dispose of Waste Electrical & Electronic Equipment in with domestic rubbish		Attention.
	For indoor use. Do not expose to rain.		High voltage / current! Danger.
	Class II construction (Double insulated)		Voltage AC
	Conforms to all relevant safety standards.		Voltage DC
	Earth		Current DC
	Fuse		Current AC
	Back light		Resistance in Ohms
	Warning! Read instruction manuals before operating and servicing this equipment.		Continuity test buzzer
	Diode test		Data hold / Screen lock
	Temperature		Auto power off
	Capacitance		Low battery display
	Frequency		

11.1 DISPOSAL

- At the end of the machine's working life, or when it can no longer be repaired, ensure that it is disposed of according to national regulations.
- Contact your local authority for details of collection schemes in your area.

In all circumstances:

- Do not dispose of power tools with domestic waste.
- Do not incinerate.
- Do not abandon in the environment.
- Do not dispose of WEEE* as unsorted municipal waste.



* Waste Electrical & Electronic Equipment.

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Service/Warranty Repair Agent:

For aftersales servicing or warranty repairs, please contact the
Draper Tools Helpline for details of an agent in your local area.

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