



DRAPER[®]

200 SERIES MULTIMETER

41820



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 200 MULTIMETER

Stock no. 41820.

Part no. DMM202.

1.2 REVISIONS:

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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: LCD display

Maximum display: 5999,3-5/6 digits with automatic polarity display and unit display

Measuring method: double integral A / D conversion

Sampling rate: approx. 3 times per second

Over-range display: "OL"

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

Storage environment: -10 ~ 50 °C, relative humidity <80%

Power supply: 1 X 6F22 9V battery

Volume (size): 143mm × 74mm × 35mm (length × width × height)

Weight: about 176g (including battery)

DC Voltage

Range	Accuracy	Resolution
600mV	±(0.8%+5d)	0.1mV
6V		1mV
60V		10mV
600V	±(1.0%+5d)	100mV

Input Impedance: 10MΩ。

Overload protection: 600VDC or 750VAC voltage peak value

AC Voltage

Range	Accuracy	Resolution
6V	±(1.2%+5d)	1mV
60V		10mV
600V	±(1.5%+5d)	100mV

Input impedance: 10MΩ.

Overload protection: 600V DC or AC peak.

Frequency response: 40 ~ 1000Hz

Display: Mean response (calibrated to sine wave RMS)

Duty cycle display: (0.1% -99.9%).

4. INTRODUCTION

DC Current

Range	Accuracy	Resolution
600 μ A	$\pm(1.0\%+10d)$	0.1 μ A
6000 μ A		1 μ A
60mA		10 μ A
600mA		100 μ A
6A	$\pm(2.0\%+10d)$	1mA
10A		10mA

Maximum input current: 10A (measurement time is ≤ 15 seconds, interval time is 15 minutes)

Overload protection: 0.4A / 250V resettable fuse 10A / 500V fuse

AC Current

Range	Accuracy	Resolution
600 μ A	$\pm(1.5\%+10d)$	0.1 μ A
6000 μ A		1 μ A
60mA		10 μ A
600mA		100 μ A
6A	$\pm(2.5\%+15d)$	1mA
10A		10mA

\triangle Note:

Maximum input current: 10A (measurement time is ≤ 15 seconds, interval time is 15 minutes)

Overload protection: 0.4A / 250V resettable fuse
10A / 500V fuse

Frequency response: 40 ~ 1000Hz.

Duty cycle display: (0.1% -99.9%)

Resistance



Range	Accuracy	Resolution
600 Ω	$\pm(1.0\%+5d)$	0.1 Ω
6k Ω		1 Ω
60k Ω	$\pm(0.8\%+4d)$	10 Ω
600k Ω		100 Ω
6M Ω	$\pm(1.2\%+10d)$	1k Ω
60M Ω	$\pm(1.8\%+15d)$	10k Ω

Open circuit voltage: approx. 2.0V.

Overload protection: 250V DC or AC peak

4. INTRODUCTION

Diode and Continuity Test

Range	Displayed value	Test Conditions
	Diode forward voltage drop.	Forward DC current of approx. 2.0mA The reverse voltage is approx. 3.0V
	The buzzer sounds continuously when the resistance of the two points is less than 50Ω and the open circuit voltage is about 1.0V.	Open circuit voltage is about 1.0V.

Overload protection: 250V DC or AC peak.

WARNING: For the safety of this range, the input voltage is disabled!

Transistor hFE Test

Range	Description	Test Conditions
hFE	The display reads the approximate value of hFE (0 to 1000)	I_b about 10μA V_{ce} about 2.8V

Capacitance

Range	Accuracy	Resolution
10nF	±(4.0 %+5d)	0.001nF
100nF		0.01nF
1μF		0.1nF
10μF		10nF
100μF		10nF
1000μF	±(3.0%+5d)	100nF
10mF		1μF
100mF		10μF
	±(5.0%+30d)	
	unspecified	

4. INTRODUCTION

Frequency

Range	Accuracy	Resolution
100Hz	$\pm(0.5\%+4d)$	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: (0.1% -99.9%)

Range	Accuracy	Resolution
0.1%-99.9%	$\pm(0.5\%+3d)$	0.1%

Temperature Measurement

Range	Accuracy	Resolution
-50°C to 300°C	$\pm(1.0\%+4d)$	1°C
301°C to 1000°C	$\pm(1.9\%+5d)$	1°C
-58°F to 600°F	$\pm(1.2\%+6d)$	1°F
601°F to 1832°F	$\pm(1.9\%+6d)$	1°F

Temperature sensor: K-type thermocouple (nickel chromium - nickel silicon) Banana probe.

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.

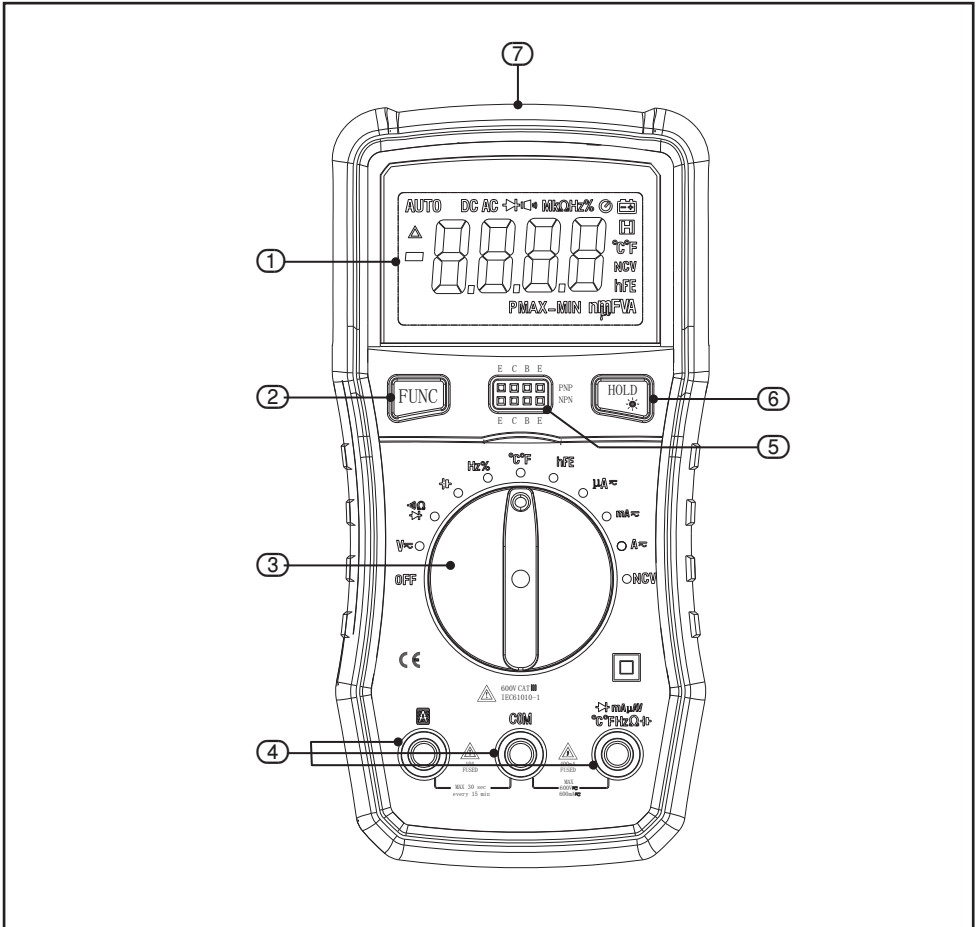
Warning

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 Measurement function button.
- ③ Measurement function range switch.
- ④ Probe sockets.
- ⑤ HFE Transistor test - input socket.
- ⑥ HOLD button, backlight on and off.
- ⑦ NCV sensor area.

6. IDENTIFICATION

6.1 LCD - FIG. 1

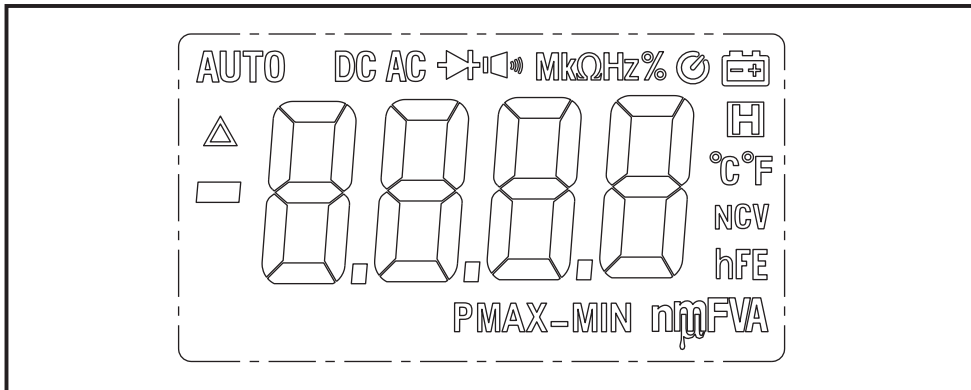


FIG.1

Symbolic	Description
DC	Direct Current
AC	Alternating Current
	Diode Check, Continuity
AUTO	Auto range
MAX-MIN	MAX-MIN measurement mode
°C °F	Degrees Celsius, Degrees Fahrenheit
	Low battery Indicator
H	Data Hold
%	Duty Cycle
mv, V	Unit of Voltage : Millivolt, Volt
uA, mA, A	Unit of Current: μA: Microamp;mA: Milliamp;A:Ampere 1A=10 ³ m A =10 ⁶ μA
nF, μF, mF	Unit of Capacitance: nF:Nanofarad, μF =Microfarad, 1 F =10 ⁶ μF =10 ⁹ nF =10 ¹² pF
Ω, kΩ, MΩ	Unit of Resistance: Ω : Ohm, kΩ : Kiloohm, MΩ :Megaohm 1 MΩ=10 ³ kΩ=10 ⁶ Ω
Hz, kHz, MHz	Unit of Frequency Hz:Hertz kHz:Kilohertz MHz:Megahertz 1 MHz =10 ³ kHz =10 ⁶ Hz
	Auto Power Off is enabled
	Relative Measurement Model
NCV	Non-contact voltage detector

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).

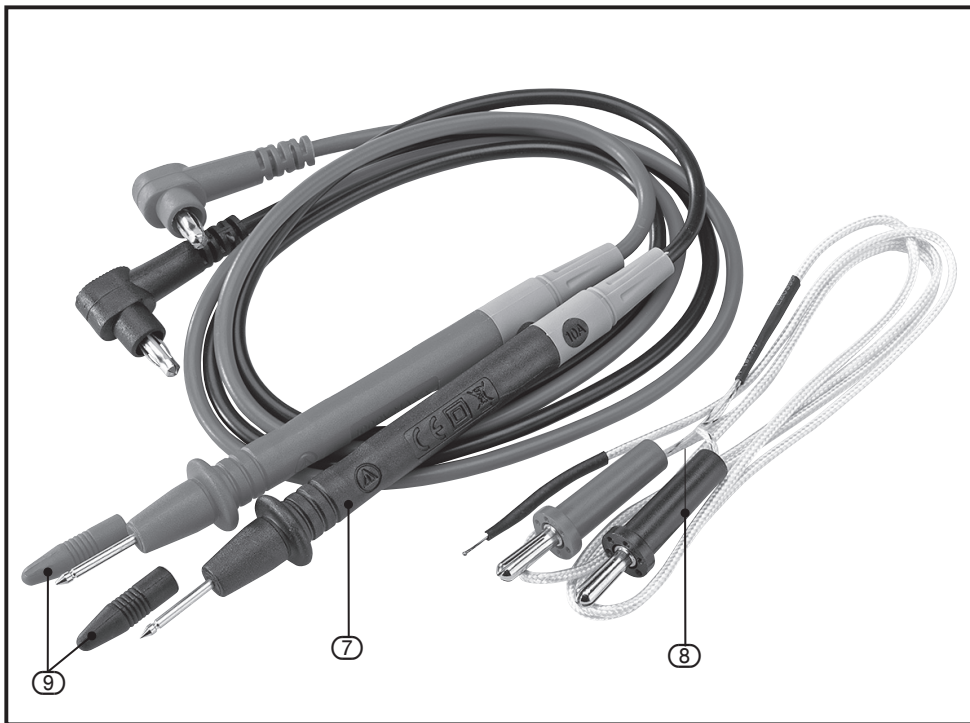
Retain the packaging material at least during the guarantee period: in case the machine needs to be returned for repair.

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.



⑦ Test probe

⑨ Test probe caps

⑧ Temperature probe

8. OPERATING INSTRUCTIONS

8.1 AUTOMATIC POWER OFF

When the instrument is idle for approx. 15 minutes, the meter will automatically enter a sleep (shutdown) mode, one minute before actual shut-down the built-in buzzer will sound five times. To restart the unit, press the FUNC key. To turn the auto power off function off Press and hold "FUNC" while turning on the meter.

8.2 BUZZER

The buzzer will sound (approx. every 0.25 seconds); when the measured voltage or current is greater than the maximum allowed range. When the voltage stays over the maximum range the buzzer will continue to sound as the over-range warning.

8.3 LCD BACKLIGHT DISPLAY

Press and hold the "HOLD" button for more than 2 seconds to turn the backlight display on and off.

8.4 DC VOLTAGE (DCV)

1. Turn the measurement function range switch to the $V=$ voltage range connect the black lead to the central com probe socket and the red lead to the right hand $V\Omega$ probe socket.
2. Press "FUNC" to select DC voltage on the LCD display.
3. The initial status of the instrument defaults to the auto ranging DC voltage mode, which displays the "AUTO" symbol.
4. Connect the test leads to the test circuit. The measured voltage will be displayed on the display.

⚠ Note:

- A) A voltage higher than DC600V or AC600V cannot be measured and will damage the meter.

8.5 AC VOLTAGE (ACV)

1. Turn the measurement function range switch to the $V=$ voltage range, connect the black lead to the central com probe socket and the red lead to the right hand $V\Omega$ probe socket.
2. Press "FUNC" to select the AC voltage range.
3. The initial state of the instrument is auto-ranging and the "AUTO" symbol is displayed.
4. Connect the test leads to the test circuit in parallel to the circuit under test. The polarity of the red test leads and the measured voltage will be displayed on the display.

⚠ Note:

- A) A voltage higher than DC600V or AC600V cannot be measured and will damage the meter.

8. OPERATING INSTRUCTIONS

8.6 DC CURRENT

1. Turn the measurement function range switch to the current range
 μA = Microamps, mA = Milliamps, A = Amps
2. Press the "FUNC" key to select the DC measurement mode (the default is DC measurement mode).
3. Connect the black lead to the central com probe socket and the red lead to the left hand 10A probe socket.
4. Connect the test leads to the circuit under test, the measured current will be displayed on the screen.

⚠ Note:

- A) This unit can not measure more than 10A, microamps " μA " cannot measure more than 6000 μA , milliamps " mA " cannot measure more than 600mA. Otherwise, the fuse will blow or damage the instrument.
If "OL" is displayed on the display, the measured current has exceeded 10 Amps.
- B) When the test leads are inserted into the current input terminal, you must NOT connect the test leads in parallel with any circuit. Otherwise, it will damage the instrument and endanger the safety of the user.

8.7 AC CURRENT

1. Turn the measurement function range switch to the current range
 μA = Microamps, mA = Milliamps, A = Amps
and press the "FUNC" key to select the AC measurement mode, and then connect the instrument to the circuit under test.
2. Connect the black lead to the central com probe socket and the red lead to the left hand 10A probe socket. The measured current value and the current polarity of the contact point of the red test lead will be displayed on the screen at the same time.

⚠ Note:

- A) A current greater than 10A can not be measured at 10A, and a current greater than 600mA can not be measured in the " mA " range, and a current greater than 600 μA can not be measured in the μA range.
If "OL" is displayed on the display, the measured current has exceeded the current range. Please select a higher range to measure.
- B) When the test leads are inserted into the current input terminal, you must NOT connect the test leads in parallel with any circuit. Otherwise, it will damage the instrument and endanger the safety of the user.

8. OPERATING INSTRUCTIONS

8.8 RESISTANCE (Ω)

1. Turn the measurement function range switch to the resistance range connect the black lead to the central com probe socket and the red lead to the right hand $V\Omega$ probe socket.
2. Connect the test leads in parallel with the measured resistance, measured resistance will be displayed on the display.

⚠ Note:

- A) When measuring the resistance, the power supply in the tested circuit must be turned off, and all the capacitors should be fully discharged.
- B) In the measurement of resistance, the appearance of any voltage will cause the measurement readings are to be incorrect.

8.9 DIODE TEST

1. Turn the measurement function range selection switch to the resistance range.
2. Connect the red lead to the anode of the diode and the black lead to the cathode of the diode. Read the result from the display.

⚠ Note:

- A) If the diode is open or the polarity is reversed, "OL" is displayed on the display.
- B) When checking the diode, the power supply in the tested circuit must be disconnected and all the capacitors should be fully discharged.
- C) After completing the measurement, immediately disconnect the test leads from the circuit under test.

8.10 CONTINUITY TEST

1. Turn the measurement function range selection switch to the resistance range.
2. Press the function key to select the continuity buzzer function.
3. If there is continuity in the circuit being tested the buzzer will sound continuously.

8.11 TRANSISTOR HFE TEST

1. Turn the measurement function range selection switch to the hFE.
2. Insert the transistor into the corresponding holes on the hFE input socket..
3. Read the result from the display.

8. OPERATING INSTRUCTIONS

8.12 CAPACITANCE (C)

1. Turn the measurement function range switch to the capacitor position.
2. Connect the black lead to the com probe socket and the red lead to the 10A probe socket.
3. Connect the test leads of the test leads in parallel to the measured capacitance, and the measured capacitance values will be displayed on the display.

⚠ Note:

- A) When measuring the capacitance, the power must be disconnected in the tested circuit, and all the capacitors should be fully discharged.
If "OL" is displayed on the display, the measured capacitance value has exceeded the current range or the capacitor is short-circuited.
- B) When measuring large capacitors, it may take a long time, so please be patient. If the measured 1000uF takes about 1 minute.
- C) After completing all measurements, immediately disconnect the test leads from the circuit under test.
- D) Overload protection: 250V DC or AC peak.

⚠ Note:

Capacitance below 100PF can not be measured.

8.13 FREQUENCY (HZ%)

1. Turn the measurement function range switch to "Hz%".
2. Press the function key to select Hz or %.
3. Connect the black lead to the com probe socket and the red lead to the 10A probe socket.
4. Connect the test leads to the source to be measured, and read the results from the display.

8.14 TEMPERATURE MEASUREMENT

1. Turn the measurement function range switch to the temperature range.
2. Connect the black lead to the com probe socket and the red lead to the 10A probe socket.
3. Insert the temperature probe into the "COM" and "V " probe sockets, "V ". The sensing tip of the temperature probe is placed on the surface of the object to be measured.

⚠ Note:

- A) Read the current measurement from the display.
- B) Press "FUNC" to select Fahrenheit, then press "FUNC" to select Celsius.

8. OPERATING INSTRUCTIONS

8.15 NCV (NON-CONTACT VOLTAGE) MEASUREMENT

Turn the measurement function range switch to the NCV range position. At this time, the instrument displays "EF" symbol, the sensor is located at the top of the unit, the closer the unit is to the power source the faster the beeper will sound.

When the voltage is greater than 110V (AC RMS), the meter displays "-" and the buzzer begins to sound.

⚠ Note:

- 1) Voltage may be present even if not indicated. Do not rely on non-contact voltage detectors to determine the presence of voltage shielding line. The probing operation may be affected by factors such as socket design, insulation thickness, and type.
- 2) The external environment interference may trigger false readings on the non-contact voltage detection.

10. EXPLANATION OF SYMBOLS

10.1 EXPLANATION OF SYMBOLS



WEEE
Do not dispose of Waste Electrical & Electronic Equipment in with domestic rubbish



For indoor use.
Do not expose to rain.



Class II construction
(Double insulated)



Conforms to all relevant safety standards.



Earth



Fuse



Back light



Warning!
Read instruction manuals before operating and servicing this equipment.



Temperature



Diode test



hFE (Transistor testing)



Low battery display



Attention.



High voltage / current!
Danger.



Voltage AC



Voltage DC



Current DC



Current AC



Resistance in Ohms



Continuity test buzzer



Data hold / Screen lock



Auto power off



Non Contact Voltage test

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.

CONTACT US

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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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