

DIGITAL MULTIMETER

With Temperature Function

USER MANUAL

**R00193**

Before using the instrument, please read this manual carefully and save for future reference.

Safety symbols.



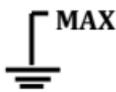
This symbol adjacent to another symbol, terminal or operating device indicates that the operator must refer to an explanation in the operating instructions to avoid personal injury or damage to the meter.

WARNING

WARNING symbol indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury.

CAUTION

CAUTION symbol indicates a potentially hazardous situation, which if not avoided, may result in a damaged product.



This symbol advises the user that the terminal(s) so marked, must not be connected to a circuit point at which the voltage with respect to earth ground exceeds (in this case 600 VAC or VDC).



This symbol, adjacent to one or more terminals identifies them as being associated with ranges that may, in normal use, be subjected to particularly hazardous voltages. For maximum safety, the meter and its test leads should not be handled when these terminals are energized.

Input limits	
Function	Maximum input
V DC or V AC	CATIII-600V DC/AC
mA DC/AC	200mA/250V DC/AC
A DC/AC	10A/250V DC/AC (30 seconds max every 15 minutes)
Resistance, Diode test, Continuity, Temperature	250V DC/AC

Maintenance Information.

- The unit may be cleaned using a dry soft cloth, do not use a wet or abrasive cloth, solvents or detergents.
- Always remove any test/temperature leads when not in use.

Calibration.

To maintain the integrity of measurements, Wolseley recommends that the multimeter is calibrated annually at an approved Calibration Laboratory.

Wolseley can offer this service, please contact calibration@raptortool.co.uk or call 0344 292 7060 to arrange.

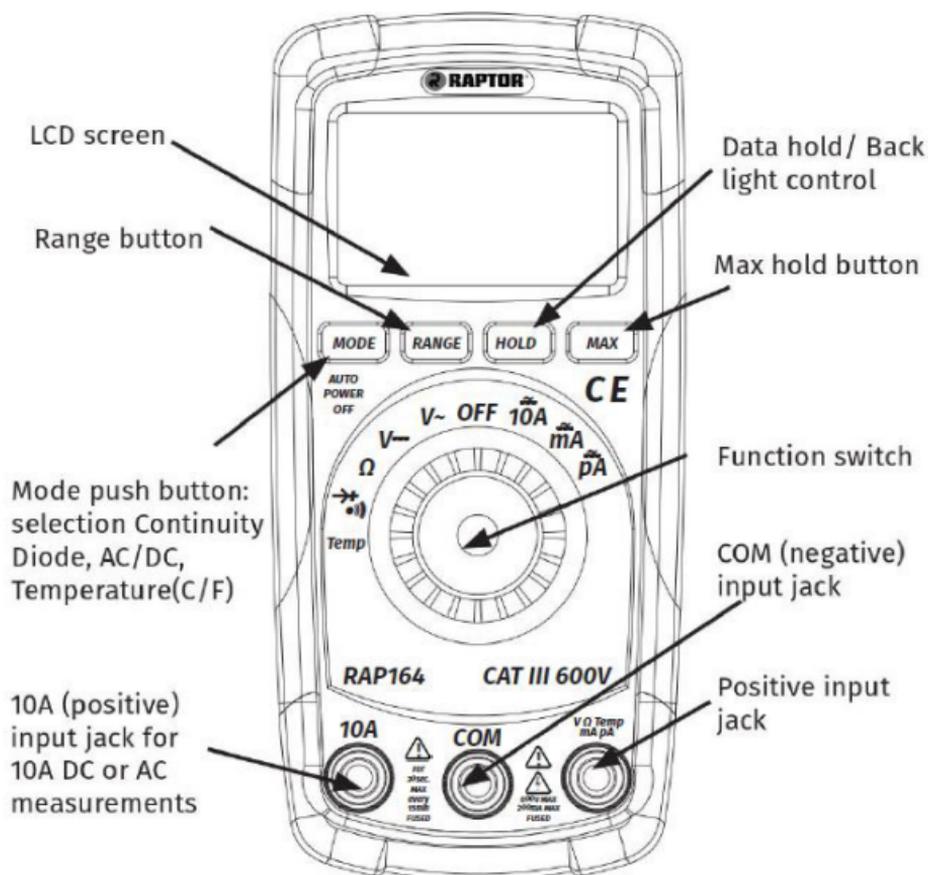
Accessories.

- Test leads.
- 9V battery.
- User manual.
- K Type 1m wire thermocouple & adaptor.

Symbols.

	Continuity
BAT	Low Battery
	Diode
HOLD	Data Hold
MAX	Max data Hold
AUTO	Auto-ranging
AC	Alternating Current or Voltage
DC	Direct Current or Voltage
°F	Degrees Fahrenheit
°C	Degrees Centigrade
	Alternating Current
	Direct Current
μ	Micro
m	Milli
Ω	Resistance
	AC & DC

Physical Appearance.



Height - 140mm
 Width - 66mm
 Depth - 37mm

Weight - 208g
 (without battery)

Measurement Method.

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. This meter has Auto OFF that automatically shuts the meter off if 15 minutes elapse 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 stabilize and give a proper measurement when connected to a circuit.

Mode Button.

To select Diode/Continuity or DC/AC current, Temperature(C/F).

Range Button.

When the meter is first turned on, it automatically goes into Auto Ranging. This automatically selects the best range for the measurements being made 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 again 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 Auto Ranging.

Data Hold/Back-light Control Button.

The Data Hold function allows the meter to “freeze” a measurement for later reference and control the back light.

1. Press the Data Hold/Back-light control button to retain the reading on the indicator. The indicator “HOLD” will be appear in the display.
2. Press the Data Hold/Back-light control button to return to normal operation.
3. Press and hold the Data Hold/Back-light control button for 2 seconds to turn the back light on. Pressing and holding the Data Hold/Back-light control button for 2 seconds will turn the back light off.

Max Hold Button

The Max Hold position is used to measure the maximum value. The maximum measured value is updated continuously. Press the Max/Hold button again to release to hold and allow further measurement.

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 plug 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.

CAUTION: Do not measure AC 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 AC position. (“V” will appear in the display).
2. Insert the black test lead banana plug into the negative (COM) jack and the red test lead banana plug 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 and value.

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 the test leads.

1. Insert the black test lead banana plug into the negative (COM) jack.
2. For current measurements up to $2000\mu\text{A}$ DC, set the function switch to the μA position and insert the red test lead banana plug into the (μA) jack.
3. For current measurements up to 200mA 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 10A position and insert the red test lead banana plug into the 10A jack.
5. Press the mode 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 in 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.

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 the test leads.

1. Insert the black test lead banana plug into the negative (COM) jack.
2. For current measurements up to $2000\mu\text{A AC}$, set the function switch to the μA position and insert the red test lead banana plug into the (μA) jack.
3. For current measurements up to 200mA 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 mode 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. And touch the red test probe tip to the positive side of the circuit.
8. Apply power to the circuit.

9. Read the current in 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 Ω position.
2. Insert the black test lead banana plug into the negative (COM) jack and the red test lead banana plug into the positive Ω 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  position.
2. Insert the black lead banana plug into the negative jack (COM) and the red test lead banana plug into the positive jack (Ω).
3. Press the mode button until the 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 30Ω , 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  position.
2. Press the mode button until the  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 (Ω).
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.

Temperature Measurements.

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

1. Insert the black side of K Type adapter into the negative (COM) jack and the red side of K Type adapter into the positive (V) jack, making sure to observe the correct polarity.
2. Pressing the mode button will change temperature unit between °C/°F.
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. The temperature will be displayed on the screen.

WARNING: To avoid electric shock always remove the thermocouple before changing to another measurement function.

Battery.

WARNING: To avoid electric shock, disconnect the test leads from any source of voltage before removing the battery door.

1. When the batteries become exhausted or drop below the operating voltage, “BAT” will appear in the right-hand side of the LCD display. The battery should be replaced.
2. Follow instructions for installing battery, see the Battery Installation section of this manual.
3. Dispose of the old battery properly.

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

Battery Installation.

WARNING: To avoid electric shock, disconnect the test leads from any source of voltage before removing the battery door.

1. Disconnect the test leads from the meter.
2. Open the battery door by loosening the screw using a Phillips head screwdriver.
3. Insert the battery into battery holder, observing the correct polarity.
4. Put the battery door back in place. Secure with the two screws.

NOTE: If your meter does not work properly, check the fuses and battery to make sure that they are still good and that they are properly inserted.

Replacing The Fuses.

WARNING: To avoid electric shock, disconnect the test leads from any source of voltage before removing the fuse door.

1. Disconnect the test leads from the meter and any item under test.
2. Fuse can be accessed by loosening the screw on the battery door using a Phillips head screwdriver.
3. Remove the old fuse from its holder by gently pulling it out.
3. Install the new fuse into the holder.
4. Always use a fuse of the proper size and value (0.2A/250V fast blow for the 200mA range, 10A/250V fast blow for the 10A range).
6. Replace battery door. Insert the screw and tighten it securely.

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

Specification.

Certification	EN61010-1, EN61010-2-033
Insulation	Class2, Double insulation
Over Voltage Category	CATIII 600V
Display	2000 Counts LCD display
Polarity	Automatic, (-) negative polarity indication
Over Range	OL indication
Low Battery Indication	BAT is displayed when battery voltage drops below the operating level
Measurement Rate	2 times per second, nominal
Auto Power Off	Approx 15mins of inactivity
Operating Environment	0 °C to 50 °C (32 °F to 122 °F) at < 70 % relative humidity.
Storage Temperature	-20 °C to 60 °C (-4 °F to 140 °F) at < 80 % relative humidity.
Power	1 x 9V battery , NEDA 1604, IEC 6F22.
Accuracy	18 °C to 28 °C (65 °F to 83 °F), less than 70 % RH

DC Voltage (auto-ranging).

Range	Resolution	Accuracy
200.0m V	0.1m V	$\pm 0.5\%$ of rdg ± 2 dgts
2.000 V	1m V	$\pm 1.0\%$ of rdg ± 2 dgts
20.00 V	10m V	
200.0 V	100m V	
600 V	1 V	$\pm 1.2\%$ of rdg ± 2 dgts

Input Impedance: 10M Ω .

Maximum Input: 600V DC rms.

AC Voltage (auto-ranging except 200mV).

Range	Resolution	Accuracy
200.0m V	0.1m V	$\pm 1.5\%$ of rdg ± 30 dgts
2.000 V	1m V	$\pm 1.2\%$ of rdg ± 3 dgts
20.00 V	10m V	$\pm 1.5\%$ of rdg ± 3 dgts
200.0 V	100m V	
600 V	1 V	$\pm 2.0\%$ of rdg ± 4 dgts

Input Impedance: 10M Ω .

Frequency range: 50 to 60Hz.

Maximum Input: 600V DC rms.

DC Current (auto-ranging for uA and mA).

Range	Resolution	Accuracy
200.0uA	0.1uA	$\pm 1.0\%$ of rdg ± 2 dgts
2000uA	1uA	$\pm 1.5\%$ of rdg ± 3 dgts
20.00mA	10uA	
200.0mA	100uA	
10A	10mA	$\pm 2.5\%$ of rdg ± 5 dgts

Overload protection: 0.2A/250V and 10A/250V fuse.

Maximum input: 200mA DC or 200mA AC rms on $\mu\text{A}/\text{mA}$ ranges, 10A DC or AC rms on 10A range.

AC Current (auto-ranging for μA and mA).

Range	Resolution	Accuracy
200.0 μA	0.1 μA	$\pm 1.5\%$ of rdg ± 5 dgts
2000 μA	1 μA	$\pm 1.8\%$ of rdg ± 5 dgts
20.00mA	10 μA	
200.0mA	100 μA	
10A	10mA	$\pm 3.0\%$ of rdg ± 7 dgts

Overload protection: 0.2A/250V and 10A/250V fuse.

Frequency range: 50 to 60 Hz.

Maximum input: 200mA DC or 200mA AC rms on $\mu\text{A}/\text{mA}$ ranges, 10A DC or AC rms on 10A range.

Resistance (auto-ranging).

Range	Resolution	Accuracy
200.0Ω	0.1Ω	±1.2% of rdg ± 4 dgts
2.000KΩ	1Ω	±1.0% of rdg ± 2 dgts
20.00KΩ	10Ω	±1.2% of rdg ± 2 dgts
200.0KΩ	100Ω	
2.000MΩ	1KΩ	
20.00MΩ	10KΩ	±2.0% of rdg ± 3 dgts

Input protection: 250V.

Diode Test.

Test current	Resolution	Accuracy
0.3mA typical	1mV	±10% of rdg ± 5 dgts

Open circuit voltage: 1.5V DC typical.

Overload protection: 250V DC or AC rms.

Audible continuity.

Audible threshold: Less than 100Ω.

Test current: <0.3mA.

Overload protection: 250V DC or AC rms.

Temperature.

Range	Resolution	Accuracy
-50°C~+1000°C	1°C	±3% of rdg ± 5 dgts
-58°F~+1832°F	1°F	±3% of rdg ± 8 dgts

Sensor: Type K Thermocouple.

Overload protection: 250V DC or AC rms.

Temperature Measuring Range	-40°C ~ 200°C -40°F ~ 392°F
Accuracy Range	± 1.5°C
Response Time	0.5 Seconds
Compliance	BS EN60584-1 BS EN60584-3

Limited warranty

1 year warranty against any manufacturing defects or faulty workmanship. This warranty does not cover fuses, disposable batteries or damage from accident, neglect, misuse, alteration, contamination or abnormal conditions of operation or handling.



WEEE Directive 2012/19/EU At the end of the product life, dispose of the instrument & batteries in a corresponding recycling centre. Do not dispose of the unit with the usual domestic refuse.

Do not burn the product.



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Customer Services:

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