



# 8 FUNCTION PROFESSIONAL AUTO-RANGING DIGITAL MULTIMETER

MODEL NO: **TM102**

Thank you for purchasing a Sealey product. Manufactured to a high standard, this product will, if used according to these instructions, and properly maintained, give you years of trouble free performance.

**IMPORTANT:** PLEASE READ THESE INSTRUCTIONS CAREFULLY. NOTE THE SAFE OPERATIONAL REQUIREMENTS, WARNINGS & CAUTIONS. USE THE PRODUCT CORRECTLY AND WITH CARE FOR THE PURPOSE FOR WHICH IT IS INTENDED. FAILURE TO DO SO MAY CAUSE DAMAGE AND/OR PERSONAL INJURY AND WILL INVALIDATE THE WARRANTY. KEEP THESE INSTRUCTIONS SAFE FOR FUTURE USE.



Refer to instructions



Electrical shock hazard

## 1. SAFETY

### 1.1. PERSONAL PRECAUTIONS

- ✓ When using this multimeter, please observe all normal safety rules concerning:
  - Protection against the dangers of electrical current.
  - Protection of the meter against misuse.
- ✓ Full compliance with safety standards can only be guaranteed if used with the test leads supplied. If necessary, they must be replaced with genuine Sealey leads with the same electrical ratings. Failure to do so will invalidate the warranty.
- ✗ **DO NOT** use leads if damaged or if the wires are bared in any way.

### 1.2. GENERAL SAFETY INSTRUCTIONS

- ✓ Familiarise yourself with the application and limitations of the multimeter as well as the potential hazards. **IF IN ANY DOUBT CONSULT A QUALIFIED ELECTRICIAN.**
  - ✓ **USE EXTREME CAUTION** when working with high voltages.
  - ✓ When the meter is connected to a circuit, do not touch unused meter terminals.
  - ✓ When the magnitude of the value to be measured is unknown, set the range selector to the highest value available.
  - ✓ Before commencing testing, follow instructions below and select the correct input sockets, function and range on the multimeter.
  - ✓ Before rotating the rotary switch to change functions, disconnect the test leads from the circuit under test.
  - ✓ Take care when working with voltages above 35V DC or 25V AC rms. These voltages are considered a shock hazard.
  - ✓ Keep fingers behind the probe barriers whilst measuring.
  - ✗ **DO NOT** test voltages above 600V - the circuitry of the multimeter may be destroyed.
  - ☐ **WARNING!** NEVER connect the multimeter to a voltage source / live circuit when the rotary switch is set to any other function apart from Voltage testing.
  - ☐ **WARNING!** NEVER perform resistance, transistor, diode or continuity measurements on live circuits. ALWAYS discharge filter capacitors in power supplies and disconnect the power when making resistance or diode tests.
  - ☐ **WARNING!** Voltage checks on electrical outlets can be difficult and misleading because of the uncertainty of connection to the recessed electrical contacts. Other means should be used to ensure that the terminals are not "live".
  - ✗ **DO NOT** use the multimeter in a potentially explosive atmosphere.
  - ✗ **DO NOT** operate the meter unless the back cover and the battery and fuse covers are in place and fastened securely.
  - ✓ If any abnormal readings are observed, the multimeter must be checked out by an authorised technician.
  - ✓ When not in use, store the multimeter carefully in a safe, dry, childproof location out of direct sunlight. Storage temperature range -20°C to 60°C.
  - ✓ ALWAYS turn off the power and disconnect the test leads before opening the cover to replace the fuse or batteries.
  - ✓ The user shall ensure that test probes are correctly selected in order to prevent danger. Probes shall be selected to ensure that adequate barriers guard against inadvertent hand contact with live conductors under test and that probes have minimal exposed probe tips. Where there is a risk of the probe tip short circuiting with other live conductors under test, it is recommended that the exposed tip length shall not exceed 4mm.
- The warnings, cautions and instructions referred to in this manual cannot cover all possible conditions and situations that may occur. It must be understood that common sense and caution are factors which cannot be built into this product, but must be applied by the operator.

### 1.3. 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.
<b>WARNING!</b>	This WARNING symbol indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury.
<b>CAUTION:</b>	This CAUTION symbol indicates a potentially hazardous situation, which if not avoided, may result damage to the product.
	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.
	This symbol indicates that a device is protected throughout by double insulation or reinforced insulation.

**NEVER** apply voltage or current to the multimeter that exceeds the specified maximum as shown below:

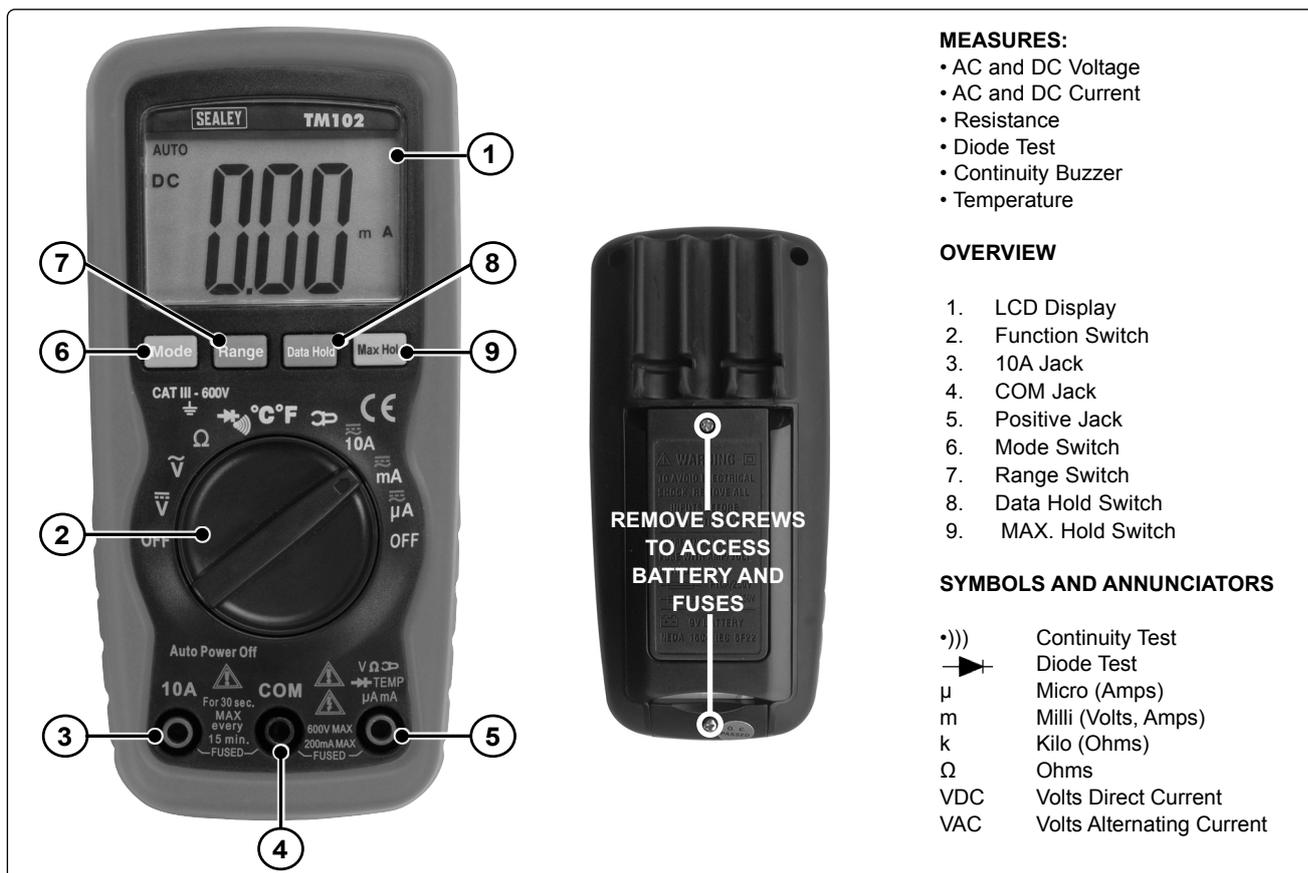
INPUT LIMITS	
Function	Maximum Input
V AC	600V AC
V DC	600V DC
MA DC/AC	200mA
A DC or A AC	10A DC/AC (30 seconds max every 15 minutes)
Resistance, Diode, Temp, Continuity	500V DC/AC

#### 1.4. BATTERY INSTALLATION

- ❑ **WARNING!** To avoid electric shock, disconnect the test leads from any source of voltage before removing the battery cover. Disconnect the test leads from the meter. Open the battery cover by loosening the two screws using a Phillips head screwdriver. Remove old battery (if applicable) and insert the new battery into battery holder, observing the correct polarity. Fit the battery cover back in place. Secure it with the screws.
- ❑ **WARNING!** To avoid electric shock, do not operate the meter until the battery cover is in place and fastened securely. **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.

## 2. INTRODUCTION

High precision auto-ranging multimeter. Conforms to EN 61010-1 CATIII 600V safety requirements for electrical equipment for measurement, control and laboratory use. Features temperature measurement capability, max./data hold and auto-power-off function. Double moulded housing with soft grip case and large display for ease of use. Practical probe, lead storage and integral upright stand for use on the workbench.



#### MEASURES:

- AC and DC Voltage
- AC and DC Current
- Resistance
- Diode Test
- Continuity Buzzer
- Temperature

#### OVERVIEW

1. LCD Display
2. Function Switch
3. 10A Jack
4. COM Jack
5. Positive Jack
6. Mode Switch
7. Range Switch
8. Data Hold Switch
9. MAX. Hold Switch

#### SYMBOLS AND ANNUNCIATORS

- ))) Continuity Test
- ▶ Diode Test
- μ Micro (Amps)
- m Milli (Volts, Amps)
- k Kilo (Ohms)
- Ω Ohms
- VDC Volts Direct Current
- VAC Volts Alternating Current

### 3. SPECIFICATION

**NOTE:** Accuracy specifications consist of two elements

1. (% reading) – This is the accuracy of the measurement circuit.

2. (± digits) – This is the accuracy of the analog to digital converter.

**NOTE:** Accuracy is stated at 65°F to 83°F (18°C to 28°C) and less than 70% RH (Relative Humidity).

FUNCTION	RANGE	RESOLUTION	ACCURACY
DC Voltage: (Auto-ranging) Input Impedance: 10MΩ Maximum Input: 600V dc or 600V ac rms (CATIII)	200.0mV	0.1mV	±0.5 Reading ±2 digits
	2.000V	1mV	±1.2 Reading ±2 digits
	20.00V	10mV	
	200.0V	100mV	
	600V	1V	±1.5 Reading ±2 digits

FUNCTION	RANGE	RESOLUTION	ACCURACY
AC Voltage: (Auto-ranging except 200mV) Input Impedance: 10MΩ Frequency Range: 50 to 60Hz Maximum input: 600V dc or 600V ac rms (CATIII)	200.0mV	0.1mV	±1.5 Reading ±30 digits
	2.000V	1mV	±1.2 Reading ±3 digits
	20.00V	10mV	±1.5 Reading ±3 digits
	200.0V	100mV	±1.5 Reading ±3 digits
	600V	1V	±2.0 Reading ±4 digits

FUNCTION	RANGE	RESOLUTION	ACCURACY
DC Current (Auto-ranging for uA/mA) Overload Protection: 0.2A/250V and 10A/250V Fuse Maximum Input: 200mA dc or 200mA rms on uA/mA ranges, 10A dc or ac rms on 10 A range	200.0μA	0.1μA	±1.0 Reading ±3 digits
	2000μA	1μA	±1.5 Reading ±3 digits
	20.00mA	10μA	
	200.0mA	100μA	
	10A	10mA	±2.5 Reading ±5 digits

FUNCTION	RANGE	RESOLUTION	ACCURACY
AC Current (Auto-ranging for uA/mA) Overload Protection: 0.2A/250V and 10A/250V Fuse Frequency Range: 50 to 60Hz Maximum Input: 200mA dc or 200mA rms on uA/mA ranges, 10A dc or ac rms on 10 A range	200.0μA	0.1μA	±1.5 Reading ±5 digits
	2000μA	1μA	±1.8 Reading ±5 digits
	20.00mA	10μA	
	200.0mA	100μA	
	10A	10mA	±3.0 Reading ±7 digits

FUNCTION	RANGE	RESOLUTION	ACCURACY
Resistance (Auto-ranging) Input Protection: 500V dc or 500V ac rms	200.0Ω	0.1Ω	±1.2 Reading ±4 digits
	2.000KΩ	1Ω	±1.0 Reading ±2 digits
	20.00KΩ	10Ω	±1.2 Reading ±2 digits
	200.0KΩ	100Ω	
	2000MΩ	1KΩ	
	20.00MΩ	10KΩ	±2.0 Reading ±3 digits

FUNCTION	TEST CURRENT
Audible Continuity Test Audible threshold: Less than 100Ω Overload protection: 500V dc or ac rms	0.3mA typical

FUNCTION	RANGE	RESOLUTION	ACCURACY
Diode Test Open circuit voltage: 1.5V dc typical Overload protection: 500V dc or ac rms	0.3mA typical	1mV	±10 Reading ±5 digits

FUNCTION	RANGE	RESOLUTION	ACCURACY
Temperature	-50°C~+1000°C	1°C	±10 Reading ±5 digits
Sensor: Type K Thermocouple			
Overload protection: 500V dc or ac rms	-58°F~+1832°F	1°F	±10 Reading ±9 digits

AC Voltage (Accuracy):	200mV ( $\pm 1.5\%$ ), 2V ( $\pm 1.2\%$ ), 20V, 200V ( $\pm 1.5\%$ ), 600V ( $\pm 2\%$ )
DC Voltage (Accuracy):	0-200mV ( $\pm 0.5\%$ ), 2V, 20V, 200V ( $\pm 1.2\%$ ), 600V ( $\pm 1.5\%$ )
AC Current (Accuracy):	200 $\mu$ A ( $\pm 1.5\%$ ), 2000 $\mu$ A, 20mA, 200mA ( $\pm 1.8\%$ ), 10A ( $\pm 3\%$ )
DC Current (Accuracy):	200 $\mu$ A ( $\pm 1\%$ ), 2000 $\mu$ A, 20mA, 200mA ( $\pm 1.5\%$ ), 10A ( $\pm 2.5\%$ )
Resistance (Accuracy):	0-200 $\Omega$ ( $\pm 1.2\%$ ), 2k $\Omega$ ( $\pm 1\%$ ), 20k $\Omega$ , 200k $\Omega$ , 2M $\Omega$ ( $\pm 1.2\%$ ), 20M $\Omega$ ( $\pm 2\%$ )
Capacitance (Accuracy):	No
Temperature (Accuracy):	-50°C to 1000°C ( $\pm 3\%$ ), -58 to 1832°F ( $\pm 3\%$ )
Frequency (Accuracy):	No
Duty Cycle:	No
Continuity Audible:	Yes
Diode Test:	Yes
Transistor Test:	No
Hi-Impact Rubber Case:	Yes
Digits x Height:	3.5 x 14mm
Low Battery Indicator:	Yes
Battery (Supplied):	1 x 9V
Information:	Data-Hold, Auto-Power-Off
Size (L x W x D):	150 x 70 x 48mm
Weight:	255g
Conformity:	EN 61010-1

## 4. OPERATION

- WARNING!** Risk of electrocution. High-voltage circuits, both AC and DC, are very dangerous and should be measured with great care. ALWAYS turn the function switch to the OFF position when the meter is not in use. The meter has an AUTO POWER OFF function which will automatically switch the meter off, after 15 minutes of inactivity.

If "OL" appears in the display during a measurement, the value exceeds the range you have selected. Change to a higher range.

### 4.1. MODE SWITCH

Selects different Modes according to function selected.

### 4.2. RANGE SWITCH

The multimeter will automatically select the appropriate range for the measurement being taken using Auto-Ranging. To manually select a range:

- 4.2.1. Press the RANGE switch. The "AUTO" display indicator will turn off.
- 4.2.2. Press the RANGE switch to cycle through the available ranges until you select the range you want.
- 4.2.2.1. Switching to another function or holding the RANGE switch down for 2 seconds will switch Auto-Ranging on again.

### 4.3. DATA HOLD SWITCH

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

- 4.3.1. Press the DATA HOLD switch to "freeze" the reading on the display. The indicator "HOLD" will appear on the display.
- 4.3.2. Press the DATA HOLD switch again to return to normal operation.

### 4.4. MAX HOLD SWITCH

This function allows the maximum reading taken to be held on the display - the maximum reading will continuously update upwards if readings change. Press the Max Hold switch to set the maximum reading. Press the Max Hold switch again and the display will return to normal. (Not applicable with Resistance Measurement, Diode Test, Continuity Test and Temperature Measurement).

**NOTE:** On some low AC and DC voltage ranges, with the test leads not connected to a device, the display may show a random 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.

### 4.5. DC VOLTAGE MEASUREMENT

**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.

- 4.5.1. Set the function switch to the V DC position, DC and mV will appear on the display.
- 4.5.2. Insert the black test lead banana plug into the negative (COM) jack. Insert the red test lead banana plug into the positive (V) jack.
- 4.5.3. 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.
- 4.5.4. Read the voltage in the display. AutoRanging will select the correct range, or manually select the desired range (see 4.2.) to obtain a higher resolution reading. The display will indicate the proper decimal point and value. If the polarity is reversed, the display will show (-) minus before the value.

### 4.6. AC VOLTAGE MEASUREMENT

- 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. Set the function switch to the V AC position, AC and V will appear on the display.

- 4.6.1. Insert the black test lead banana plug into the negative (COM) jack. Insert red test lead banana plug into the positive (V) jack.
- 4.6.2. 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.
- 4.6.3. Read the voltage in the display. AutoRanging will select the correct range, or manually select the desired range (see 4.2.) to obtain a higher resolution reading. The display will indicate the proper decimal point and value. If the polarity is reversed, the display will show (-) minus before the value.

#### 4.7. DC CURRENT MEASUREMENT

**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.

- 4.7.1. Insert the black test lead banana plug into the negative (COM) jack.
- 4.7.2. For current measurements up to 2000 $\mu$ A DC, set the function switch to the  $\mu$ A position and insert the red test lead banana plug into the ( $\mu$ A) jack.
- 4.7.3. 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.
- 4.7.4. For current measurements up to 10A DC, set the function switch to the 10A range and insert the red test lead banana plug into the (10A) jack.
- 4.7.5. Press the Mode switch to select DC on the display.
- 4.7.6. Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
- 4.7.7. Connect test leads in series with the circuit under measurement.
- 4.7.8. Apply power to the circuit.
- 4.7.9. Read the current in the display. AutoRanging will select the correct range, or manually select the desired range (see 4.2.) to obtain a higher resolution reading. The display will indicate the proper decimal point and value. If the polarity is reversed, the display will show (-) minus before the value.

#### 4.8. AC CURRENT MEASUREMENT

- 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.

- 4.8.1. Insert the black test lead banana plug into the negative (COM) jack.
- 4.8.2. For current measurements up to 2000 $\mu$ A AC, set the function switch to the  $\mu$ A position and insert the red test lead banana plug into the ( $\mu$ A) jack.
- 4.8.3. 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.
- 4.8.4. For current measurements up to 10A AC, set the function switch to the 10A range and insert the red test lead banana plug into the (10A) jack.
- 4.8.5. Press the Mode switch to select AC on the display.
- 4.8.6. Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
- 4.8.7. Connect test leads in series with the circuit under measurement.
- 4.8.8. Apply power to the circuit.
- 4.8.9. Read the current in the display. AutoRanging will select the correct range, or manually select the desired range (see 4.2.) to obtain a higher resolution reading. The display will indicate the proper decimal point and value. If the polarity is reversed, the display will show (-) minus before the value.

#### 4.9. RESISTANCE MEASUREMENT

- 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.

- 4.9.1. Set the function switch to the  $\Omega$  position.
- 4.9.2. Insert the black test lead banana plug into the negative (COM) jack. Insert the red test lead banana plug into the positive  $\Omega$  jack.
- 4.9.3. Touch the test probe tips across the circuit or component under test. It is best to disconnect one side of the component under test, so the rest of the circuit will not interfere with the resistance reading.
- 4.9.4. Read the resistance in the display. AutoRanging will select the correct range, or manually select the desired range (see 4.2.) to obtain a higher resolution reading. The display will indicate the proper decimal point and value. If the polarity is reversed, the display will show (-) minus before the value.

#### 4.10. AUDIBLE CONTINUITY TEST

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

- 4.10.1. Set the function switch to the  $\rightarrow + / \bullet$ ) position and press the Mode switch until  $\bullet$ ) is displayed.
- 4.10.2. Insert the black test lead banana plug into the negative (COM) jack. Insert the red test lead banana plug into the positive ( $\Omega$ ) jack.
- 4.10.3. Touch the test probe tips to the circuit or wire you wish to check.
- 4.10.4. If the resistance is less than approximately 30 $\Omega$ , the audible signal will sound. If the circuit is open, the display will indicate "I".

#### 4.11. DIODE TEST

- 4.11.1. Insert the black test lead banana plug into the negative (COM) jack. Insert the red test lead banana plug into the positive  $\rightarrow +$  jack.
- 4.11.2. Set the function switch to the  $\rightarrow + / \bullet$ ) position and press the Mode switch until  $\rightarrow +$  is displayed.
- 4.11.3. Touch the test probes to the diode under test and note the reading down. Reverse the probe polarity and note the reading again. If one reading has a value and the other is OL, then the diode is OK. If both readings are OL, then the diode is open. If both readings are small or 0, then the diode is shorted.

**NOTE:** the value shown during the check is the forward voltage.

#### 4.12. TEMPERATURE MEASUREMENT

- ❑ **WARNING!** To avoid electric shock, disconnect any test probes from any source of voltage before making a temperature measurement.
- 4.12.1. To measure temperature, set the function switch to the °C/°F selection and press Mode switch to select either °Fahrenheit range or °Centigrade range.
- 4.12.2. Insert the type K thermocouple probe “-” negative banana plug into the negative COM jack and the “+” banana plug into the positive Temp jack.
- 4.12.3. 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).
- 4.12.4. Read the temperature in the display. The digital reading will indicate the proper decimal point and value.
- ❑ **WARNING!** To avoid electric shock, be sure the thermocouple has been removed before changing to another measurement function.

### 5. MAINTENANCE

#### 5.1. REPLACING THE BATTERY

- ❑ **WARNING!** To avoid electric shock, disconnect the test leads from any source of voltage before removing the battery cover.
- 5.1.1. When the battery becomes exhausted or drop below the operating voltage, “BAT” will appear in the LCD display. The battery should be replaced.
- 5.1.2. Follow instructions for Battery Installation- section 1.4. of this manual. Dispose of the old battery properly - see recycling statements at the end of this manual.
- ❑ **WARNING!** To avoid electric shock, do not operate the meter until the battery cover is in place and fastened securely.

#### 5.2. REPLACING THE FUSES

- ❑ **WARNING!** To avoid electric shock, disconnect the test leads from any source of voltage before removing the fuse cover.
- 5.2.1. Disconnect the test leads from the meter and any item under test.
- 5.2.2. Open the fuse cover by loosening the screws on the cover using a Phillips head screwdriver.
- 5.2.3. Remove the old fuse from its holder by gently pulling it out.
- 5.2.4. Install a new fuse into the holder.
- 5.2.5. 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).
- 5.2.6. Fit the fuse cover back in place. Insert the screws and tighten them securely.
- ❑ **WARNING!** To avoid electric shock, do not operate the meter until the fuse cover is in place and fastened securely.
- ❑ **WARNING!** Before attempting to open the case, ensure that the test leads have been disconnected from the multimeter and that it is switched off to avoid electric shock hazard.
- 5.3. Clean the multimeter’s casing using a very slightly dampened cloth and mild detergent - do not use any abrasives or solvents. Clean the inside of each terminal using a swab soaked in isopropyl alcohol, use a new swab to apply a light coat of machine oil to each terminal.
- 5.4. If the multimeter is to be stored for a long period of time, remove the battery first to avoid any damage.



#### ENVIRONMENT PROTECTION

Recycle unwanted materials instead of disposing of them as waste. All tools, accessories and packaging should be sorted, taken to a recycling centre and disposed of in a manner which is compatible with the environment. When the product becomes completely unserviceable and requires disposal, drain any fluids (if applicable) into approved containers and dispose of the product and fluids according to local regulations.



REGISTER YOUR PURCHASE HERE



#### WEEE REGULATIONS

Dispose of this product at the end of its working life in compliance with the EU Directive on Waste Electrical and Electronic Equipment (WEEE). When the product is no longer required, it must be disposed of in an environmentally protective way. Contact your local solid waste authority for recycling information.



#### BATTERY REMOVAL

Under the Waste Batteries and Accumulators Regulations 2009, Jack Sealey Ltd are required to inform potential purchasers of products containing batteries (as defined within these regulations), that they are registered with Valpak’s registered compliance scheme. Jack Sealey Ltd Batteries Producer Registration Number (BPRN) is BPRN00705.

**Note:** It is our policy to continually improve products and as such we reserve the right to alter data, specifications and component parts without prior notice.

**Important:** No Liability is accepted for incorrect use of this product.

**Warranty:** Guarantee is 12 months from purchase date, proof of which is required for any claim.

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