



INSTRUCTIONS FOR:

## DIGITAL MULTIMETER - 7 FUNCTION

MODEL No: **MM19.V3**

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.**

### 1. SAFETY

- ✓ 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.
  - x **DO NOT** test voltages above 750V AC - 1000V DC - 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".
  - x **DO NOT** use the multimeter in a potentially explosive atmosphere.
  - ✓ **NEVER** operate the meter unless the back cover and the battery and fuse doors 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 doors 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



#### WARNING

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.

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

#### CAUTION

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.

❑ **WARNING!** NEVER apply voltage or current to the meter that exceeds the specified maximum stated.

❑ **WARNING!** USE EXTREME CAUTION when working with high voltages.

#### 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 cover screws using a Phillips head screwdriver.

Insert the battery into battery holder, observing the correct polarity.

Replace the battery cover. Secure 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. FEATURES

High quality general purpose multimeter with a large (46x25mm), clear and easy-to-read LCD display. Supplied with test leads.

Measures:

- AC and DC Voltage
- DC Current
- Resistance
- Diode/Transistor Verification Model



1. Function Switch
2. LCD Display
3. Common Jack
4. V.Ω.mA Jack
5. 10A Jack
6. Note: Fuse and battery compartment are at the rear of the unit.



#### SYMBOLS AND ANNUNCIATORS

- ))) Continuity
- ▶ Diode Test
- μ Micro (amps)
- m Milli (volts, amps)
- k Kilo (ohms)
- Ω Ohms
- DCV Volts Direct Current
- ACV Volts Alternating Current
- DCA Amps Direct Current
- hFE Transistor Measurement

### 3. SPECIFICATION

| Function   | Range  | Resolution | Accuracy  |
|--|--|------------|---|
| DC Voltage<br>(V DC)   | 200mV  | 100μV      | ±(1.5% reading + 2 digits)                        |
|  | 2000mV   | 1mV        |   |
|  | 20V  | 10mV       |   |
|  | 200V   | 100mV      |   |
|  | 1000V  | 1V         | ±(1.8% reading + 2 digits)                        |
|  | OVERLOAD PROTECTION: 220Vrms AC for 200mV range and 1000VDC or 750Vrms AC for other ranges.  |            |   |
| AC Voltage<br>(V AC)   | 200V   | 100mV      | ±(2% reading + 2 digits)                          |
|  | 750V   | 1V         | (50/60Hz)   |
|  | OVERLOAD PROTECTION: 1000 V DC or 750Vrms AC for all ranges.<br>RESPONSE: Average responding, calibrated in rms of a sine wave.<br>FREQUENCY RANGE: 45Hz - 450Hz |            |   |
| DC Current<br>(A DC)   | 200μA  | 100nA      | ±(2.0% reading + 2 digits)                        |
|  | 2000 μA  | 1 μA       |   |
|  | 20mA   | 10μA       |   |
|  | 200mA  | 100μA      | ±(2.2% reading + 2 digits)                        |
|  | 10A  | 10mA       | ±(2.0% reading + 2 digits)                        |
|  | OVERLOAD PROTECTION: 200mA /250V fuse (10A range unfused)<br>MEASURING VOLTAGE DROP: 200mV.  |            |   |
| Resistance   | 200Ω   | 0.1Ω       | ±(1.8% reading + 5 digits)                        |
|  | 2000Ω  | 1Ω         | ±(1.8% reading + 2 digits)                        |
|  | 20kΩ   | 10kΩ       |   |
|  | 200kΩ  | 100Ω       |   |
|  | 2000kΩ   | 1kΩ        | ±(2% reading + 2 digits)                          |
|  | MAXIMUM OPEN CIRCUIT VOLTAGE: 2.8V<br>OVERLOAD PROTECTION: 15 seconds maximum 220Vrms on all ranges.   |            |   |
|  Diode Test         | Display Voltage Drop Approximation   |            |   |
|  | OVERLOAD PROTECTION: 15 seconds maximum 220Vrms Sounds alarm.  |            |   |
|  Audible Continuity | Built-in buzzer sounds if resistance is less than 100Ω   |            |   |
|  | OVERLOAD PROTECTION: 15 seconds maximum 220Vrms Sounds alarm.  |            |   |
| hFE<br>Transistor hFE<br>Data Test   | 0 ~ 1000   |            | Basic Current is Approx. 10μA., Vce is Approx. 3V |
|  | Overload Protection: 10 seconds max. 220Vrms.  |            |   |

NOTE! Accuracy specifications consist of two elements:

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

(+ 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 75% RH.

Safety: For indoor use and in accordance with Overvoltage Category II, Pollution Degree 2. Category II includes local level, appliance, portable equipment, etc., with transient overvoltages less than Overvoltage Category III.

## 4. OPERATION

- ☐ **WARNING!** Risk of electrocution. High-voltage circuits, both AC and DC, are very dangerous and should be measured with great care. Do Not measure voltages that might exceed 500 V above earth ground.

ALWAYS turn the function switch to the "OFF" position when the meter is not in use.

**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.

### 4.1. 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.

- 4.1.1. Set the function switch to the highest VDC position.
- 4.1.2. Insert the black test lead banana plug into the negative (COM) jack. Insert the red test lead banana plug into the positive (V) jack.
- 4.1.3. 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.
- 4.1.4. Read the voltage in the display. Reset the function switch to successively lower VDC positions to obtain a higher resolution reading. The display will indicate the proper decimal point and value.

### 4.2. AC VOLTAGE MEASUREMENTS

- ☐ **WARNING!** Risk of Electrocutation. 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.

- 4.2.1. Set the function switch to the highest VAC position.
- 4.2.2. Insert the black test lead banana plug into the negative (COM) jack. Insert red test lead banana plug into the positive (V) jack.
- 4.2.3. 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.
- 4.2.4. Read the voltage in the display. Reset the function switch to successively lower VAC positions to obtain a higher resolution reading.

### 4.3. 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.

- 4.3.1. Insert the black test lead banana plug into the negative (COM) jack.
- 4.3.2. For current measurements up to 200mA DC, set the function switch to the highest DC mA position and insert the red test lead banana plug into the (mA) jack.
- 4.3.3. 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.
- 4.3.4. Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
- 4.3.5. Connect test leads in series with the circuit under measurement.
- 4.3.6. Apply power to the circuit.
- 4.3.7. Read the current in the display. For mA DC measurements, reset the function switch to successively lower mA DC positions to obtain a higher resolution reading. The display will indicate the proper decimal point and value.

### 4.4. 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.

- 4.4.1. Set the function switch to the highest  $\Omega$  position.
- 4.4.2. Insert the black test lead banana plug into the negative (COM) jack. Insert the red test lead banana plug into the positive  $\Omega$  jack.
- 4.4.3. 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.
- 4.4.4. Read the resistance in the display and then set the function switch to the lowest  $\Omega$  position that is greater than the actual or any anticipated resistance. The display will indicate the proper decimal point and value.

#### 4.5. AUDIBLE CONTINUITY CHECK

- ☐ **WARNING!** To avoid electric shock, never measure continuity on circuits or wires that have voltage on them.
- 4.5.1. Set the function switch to the  $\rightarrow / \cdot$  position.
- 4.5.2. Insert the black lead banana plug into the negative (COM) jack. Insert the red test lead banana plug into the positive ( $\Omega$ ) jack.
- 4.5.3. Touch the test probe tips to the circuit or wire you wish to check.
- 4.5.4. If the resistance is less than approximately 100 $\Omega$ , the audible signal will sound.

#### 4.6. DIODE TEST

- 4.6.1. Red test lead to "V. $\Omega$ .mA", Black lead to "COM".
- 4.6.2. RANGE switch to  $\rightarrow \vdash$  position.
- 4.6.3. Connect the red test lead to the anode of the diode to be measured and black test lead to cathode.
- 4.6.4. The forward voltage drop in mV will be displayed. If the diode is reversed, figure "1" will be shown.

#### 4.7. TRANSISTOR hFE MEASUREMENT

- 4.7.1. RANGE switch to the hFE position.
- 4.7.2. Determine whether the transistor is NPN or PNP type and locate the Emitter, Base and Collector leads. Insert the leads into the proper holes of the hFE Socket on the front panel.
- 4.7.3. The meter will display the approximate hFE value at the condition of base current 10mA and VCE 2.8 V.

### 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 door.
- 5.1.1. When the battery becomes exhausted the battery should be replaced.
- 5.1.2. Follow instructions for installing battery. See the Battery Installation section of this manual (page 2).  
Dispose of the old battery properly.
- ☐ **WARNING!** To avoid electric shock, do not operate your 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.
- ☐ **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.
- 5.2.1. Disconnect the test leads from the meter and any item under test.
- 5.2.2. Open the fuse cover by loosening the screw 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 the new fuse into the holder.
- 5.2.5. Always use a fuse of the proper size and value (200mA/250V).
- 5.2.6. Replace the fuse cover back in place. Insert the screw and tighten it securely.
- ☐ **WARNING!** To avoid electric shock, do not operate your meter until the fuse cover is in place and fastened securely.
- 5.3. Clean the multimeter's casing using a 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.

### Environmental Protection.



Recycle unwanted materials instead of disposing of them as waste. All tools, accessories and packaging should be sorted, taken to a recycle centre and disposed of in a manner which is compatible with the environment.



When the product is no longer required, it must be disposed of in an environmentally protective way.

### Battery Removal.



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

Disconnect the test leads from the meter.

Open the battery cover by loosening the two cover screws using a Phillips head screwdriver (FIG.A below).

Lift the battery from the meter and unclip from the battery socket.

Replace the battery cover back in place. Secure with the screws.

**WARNING!** To avoid electric shock, do not operate the meter until the battery cover is in place and fastened securely.

**Dispose of batteries according to local authority guidelines.**



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's Batteries Producer Registration Number (BPRN) is BPRN00705

FIG.A



**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 will be required for any claim.

**INFORMATION:** For a copy of our latest catalogue and promotions call us on 01284 757525 and leave your full name and address, including postcode.

