



# INSTRUCTIONS FOR: 20 FUNCTION MULTIMETER WITH THERMOCOUPLE MODEL: MM20

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. PLEASE KEEP THESE INSTRUCTIONS SAFE FOR FUTURE USE.

## 1. SAFETY INSTRUCTIONS

### 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 electronic ratings. Failure to do so will invalidate the warranty.
- x **DO NOT** use leads if damaged or if the wire is 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.*
- ✓ 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 beforehand, set the range selector to the highest value.
- ✓ Before rotating the range selector to change functions, disconnect test leads from the circuit under test.
- ☐ **WARNING!** *Never perform resistance measurements on live circuits.*
- ✓ Always be careful when working with voltages above 60Vdc or 30Vac rms. Keep your fingers behind the probe barriers while measuring.
- ✓ Before attempting to insert transistors for testing, ensure that test leads have been disconnected.
- ✓ Components should not be connected to the transistor socket, capacitor socket or temperature socket when taking voltage measurements with the test leads.
- ✓ When not in use, store the multimeter carefully in a safe, dry, childproof location. Storage temperature range -10°C to 50°C.

## 2. FEATURES

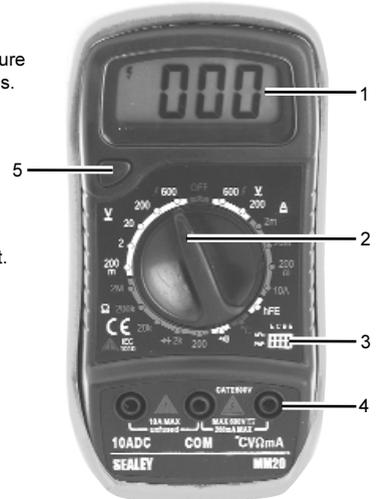
Heavy duty general purpose multimeter with clear and easy to read LCD display. Features data hold function, temperature probe and diode test facility. Housed in rugged rubber boot with integral stand. Supplied with full set of leads and probes.

Measures:
• AC and DC Voltage
• DC Current
• Resistance
• Temperature
• Diode/Transistor Verification Mode

Function	Red Lead Connection	Input Limits
V $\overline{\text{---}}$	$^{\circ}\text{CV}\Omega\text{mA}$	600V dc
V $\sim$	$^{\circ}\text{CV}\Omega\text{mA}$	600V ac (sine)
A $\overline{\text{---}}$	$^{\circ}\text{CV}\Omega\text{mA}$	200mA dc
A $\overline{\text{---}}$ 10A	10ADC	10A dc
hFE	N/A	
$^{\circ}\text{C}$	$^{\circ}\text{CV}\Omega\text{mA}$	
$\rightarrow$	$^{\circ}\text{CV}\Omega\text{mA}$	
$\rightarrow$ 2k	$^{\circ}\text{CV}\Omega\text{mA}$	2k $\Omega$
$\Omega$	$^{\circ}\text{CV}\Omega\text{mA}$	2M $\Omega$

### Layout:

1. LCD Display.
2. Rotary Switch.
3. Transistor Socket.
4. Input Sockets.
5. Hold Button.



## 3. OPERATION

- ☐ **WARNING!** Ensure that you read, understand and apply the safety and operational instructions before connecting the multimeter. Only when you are sure that you understand the procedures is it safe to proceed with testing.

Operating temperature range 0°C to 40°C.

**Remember** to turn on multimeter before use and to turn it off when measurement is completed.

**NOTE:** WHEN THE FIGURE '1' IS DISPLAYED, IT INDICATES AN OVER-RANGE SITUATION AND A HIGHER RANGE NEEDS TO BE SELECTED.

### 3.1. MEASURING VOLTAGE

- 3.1.1. Connect the black test lead to the COM input socket and the red test lead to the  $^{\circ}\text{CV}\Omega\text{mA}$  input socket.
- 3.1.2. Set the rotary switch to the required V $\overline{\text{---}}$  (dc) or V $\sim$  (ac) range and connect test leads across the source or load under measurement. The polarity of the red test lead connection will be indicated when measuring dc voltages.

### 3.2. MEASURING CURRENT

- 3.2.1. Connect the black test lead to the COM input socket and the red test lead to the  $^{\circ}\text{CV}\Omega\text{mA}$  input socket for measuring a maximum of 200mA. For a maximum of 10A connect the red lead to the 10A socket.
- 3.2.2. Set the rotary switch to the required A $\overline{\text{---}}$  (dc) or A $\sim$  (ac) range and connect test leads in series with the load under measurement. The polarity of the red lead connection will be indicated when measuring dc.

### 3.3. MEASURING RESISTANCE

- 3.3.1. Connect the black lead to the COM input socket and the red test lead to the  $^{\circ}\text{CV}\Omega\text{mA}$  input socket (the polarity of the red lead is '+').
- 3.3.2. Set the rotary switch to the required  $\Omega$  range and connect the test leads across the resistance under measurement.
- 3.3.3. When checking in-circuit resistance, ensure that the circuit under test has all power removed and all capacitors have been fully discharged.
- 3.3.4. When measuring resistance over 1M $\Omega$ , the meter may take a few seconds to get a stable reading. This is normal for high resistance measurements.

### 3.5. DIODE TESTING

- 3.5.1. Connect the black lead to the COM input socket and the red lead to the  $^{\circ}\text{CV}\Omega\text{mA}$  input socket (the polarity of the red lead is '+').
- 3.5.2. Set the rotary switch to the  $\rightarrow$  position and connect the red lead to the anode and the black lead to the cathode of the diode under test. The meter will show the approximate forward voltage of the diode. If the leads are reverse connected, only '1' is displayed.

### 3.6. TRANSISTOR TESTING

- 3.6.1. Set the rotary switch to the hFE position.
- 3.6.2. Determine whether the transistor to be tested in NPN or PNP type and locate the Emitter, Base and Collector leads. Insert leads of the transistor into the correct holes in the transistor testing socket.
- 3.6.3. The meter will show the approximate hFE value at test conditions of base current 10µA and Vce 3V.

### 3.7. CONTINUITY TEST

- 3.7.1. Connect the black lead to the COM input socket and the red lead to the °CVΩmA input socket (the polarity of the red lead is '+').
- 3.7.2. Set the rotary switch to the  position and connect the test leads across the two points of the circuit under test. If continuity exists (i.e. resistance less than 50Ω) the built-in buzzer will sound.

### 3.8. MEASURING TEMPERATURE

- 3.8.1. Set the rotary switch to the °C position and the LCD display will show the ambient temperature.
- 3.8.2. Insert the red lead of the K-type thermocouple plug into the °CVΩmA input socket on the front panel and the black lead into the COM. Now touch the object to be measured with the thermocouple probe.

**WARNING!** To avoid electric shock, ensure that the thermocouple has been removed before changing to another function measurement.

## 4. SPECIFICATION

RESISTANCE			AC VOLTAGE			DC CURRENT		
Range	Accuracy	Resolution	Range	Accuracy	Resolution	Range	Accuracy	Resolution
200Ω	±0.8% of reading ±3 digits	0.1Ω	200V	±1.2% of rdg ± 10 digits	100mV	2mA	±1.5% of reading ±1 digit	1µA
2kΩ	±0.8% of reading ±2 digit	1Ω	600V	±1.2% of rdg ± 10 digits	1V	20mA	±2.0% of reading ±5 digits	10µA
20kΩ	±0.8% of reading ±2 digit	10Ω	Overload protection: 600V dc or rms. ac for all ranges. Frequency range: 40Hz - 400Hz Response: Average calibrated in rms sine wave.			200mA	±1.5% of reading ±1 digits	0.1mA
200kΩ	±0.8% of reading ±2 digit	100Ω				10A	±2.0% of reading ±5 digits	10mA
2MΩ	±1.0% of reading ±2 digit	1kΩ				Overload protection: F200mA/250V fuse 10A range unfused		
Maximum open circuit voltage: 3.2V Overload protection: 250V dc or rms. ac for all ranges								

DC VOLTAGE		
Range	Accuracy	Resolution
200mV	±0.5% of reading ±2 digits	0.1mV
2V	±0.5% of reading ±2 digits	1mV
20V	±0.5% of reading ±2 digits	10mV
200V	±0.5% of reading ±2 digits	0.1V
600V	±0.8% of reading ±2 digits	1V
Input impedance: 10MΩ for all ranges.		

TEMPERATURE				
Range	Accuracy			Resolution
	-20° to 0°C	0° to 400°C	400°C to 1000°C	
-20°C to 1000°C	± 10.0% of rdg ± 2 digits	± 1.0% of rdg ± 3 digits	± 2.0% of rdg	1°C

TRANSISTOR hFE TEST (0-1000)			
Range	Test Range	Test Current	Test Voltage
NPN & PNP	0-1000	1b=10µA	Vce=3V

#### 4.1. Accuracy Calculation

Example: Test reading on 200Vdc range is 56.4V. Accuracy is ±0.5% of reading ±2 digit.  
 Reading ±2 digit = 56.4 ±2 on the last figure i.e. 56.2 to 56.6V.

±0.5% on this range gives 56.2 - 0.5% to 56.6 + 0.5% or 55.9 to 56.9V. Therefore the actual voltage lies between 55.9 and 56.9V.

Note: Accuracy is specified for a period of one year after calibration and at 18°C to 28°C with a relative humidity of 80%.

## 5. MAINTENANCE

- WARNING!** Before attempting to open the case, ensure that test leads have been disconnected from measurement circuits to avoid electric shock hazard.
- 5.1. For continued protection against fire, replace fuse only with another of the same rating (F200mA/250V Quick Acting). Fuse is located under the circuit board. To gain access to the fuse, remove the protective rubber boot and the two screws from the rear of the meter. Lift off the rear cover, replace the fuse and re-assemble in reverse order.
- 5.2. If the battery sign  appears on the LCD display, it indicates that the battery should be replaced. Repeat the steps detailed in section 5.1 but replacing the battery (9V PP3) instead of the fuse.

#### 5.3. SPARE PARTS

- MM20.01 TEST LEADS FOR MM20
- MM20.02 FUSE (0.5A) FOR MM20
- MM20.03 PROBE FOR MM20

## 6. DECLARATION OF CONFORMITY

**Declaration of Conformity** We, the sole UK importer, declare that the product listed below is in conformity with the following standards and directives.

**DIGITAL MULTIMETER**  
**Model: MM20**

89/336/EEC EMC Directive  
 73/23/EEC Low Voltage Directive  
 93/68/EEC CE Marking Directive



The construction file for this product is held by the Manufacturer and may be inspected, by a national authority, upon request to Jack Sealey Ltd.

Signed by Mark Sweetman

22 November 2004

For Jack Sealey Ltd. Sole UK importer of Sealey Professional Tools.

**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 equipment.

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

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

	Sole UK Distributor, Sealey Group, Bury St. Edmunds, Suffolk.
	01284 757500      01284 703534  sales@sealey.co.uk  www.sealey.co.uk