INSTRUCTIONS FOR:

10 FUNCTION MULTIMETER with TEMP. PROBE

MODEL: **MM402**

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 electronic 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.

✗ **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 linked to a measurement circuit, do not touch unused meter terminals.

✓ When the value scale 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.

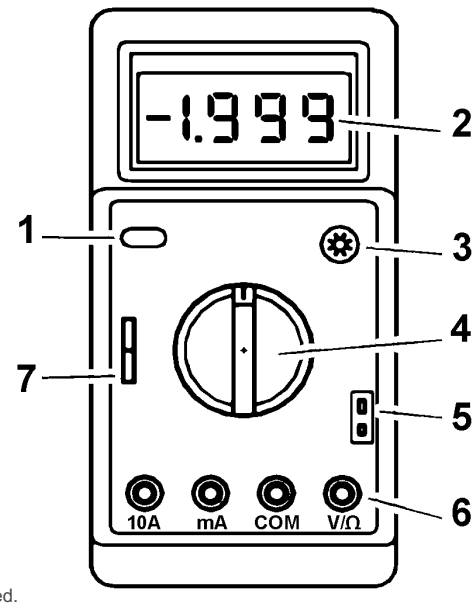
✓ Before attempting to insert transistors for testing, ensure that test leads have been disconnected.

✓ Components should not be connected to the transistor socket, capacitor socket or temperature socket when making voltage measurement with the test leads.

✓ When not in use, store the multimeter carefully in a safe, dry, childproof location. Storage temperature range -10ºC to 50ºC.

2. FEATURES

✓ Push button ON-OFF power switch.
✓ Single 32-position easy-to-use rotary switch for function and range selection.
✓ High sensitivity 100µV.
✓ Automatic polarity indication on DC range.
✓ Automatic over-range indication on DC range.
✓ All ranges fully protected.
✓ Diode testing with 1mA fixed current.
✓ Capacitance measurements 1µF to 20µF.
✓ Resistance measurements 0.1Ω to 20MΩ.
✓ Transistor hFE test with ib-100µA.
✓ Temperature measurement with or without K type thermocouple.



Layout:
1. Power Switch.
2. LCD Display.
3. Transistor Socket.
4. Rotary Switch.
5. Temperature Socket.
6. Input Sockets.
7. Capacitor Socket.

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 0ºC to 40ºC.

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 'V/Ω' input socket.

3.1.2. Set the rotary switch to the required 'V ⎓ ' (dc) or 'V ~ ' (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 'mA' input socket for measuring a maximum of 200mA or the '10A' input socket for measuring a maximum of 20A.

3.2.2. Set the rotary switch to the required 'A ⎓ ' (dc) or 'A ~' (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 the V/Ω input socket (the polarity of the red lead is '+').
3.3.2. Set the rotary switch to the required 'Ω' range and connect the test leads across the resistance under measurement.
3.3.3. If the resistance being measured exceeds the maximum value of the range selected or the input is not connected, an over-range indication '1' will be displayed.
3.3.4. When checking in-circuit resistance, ensure that the circuit under test has all power removed and all capacitors have been fully discharged.
3.3.5. When measuring resistance over 1MΩ, the meter may take a few seconds to get a stable reading. This is normal for high resistance measurements.
3.3.6. In the 200MΩ range the display reading is approx. 1.0 when the test leads are shorted. This figure must be subtracted from measured results. For example, when measuring a 100MΩ resistance the display reading would be 101.0 and the corrected result would be 101.0 - 1.0 = 100MΩ.

3.4. MEASURING CAPACITANCE

3.4.1. Set the rotary switch to the required 'Cx' range.
3.4.2. Before inserting capacitor into the capacitor socket, ensure that the capacitor has been fully discharged.

3.5. DIODE TESTING

3.5.1. Connect the black lead to the 'COM' input socket and the red lead to to the V/Ω input socket (the polarity of the red lead is '+').

3.5.2. Set the rotary switch to the ' ⊣▶⊢ ' 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 2.8V.

3.7. CONTINUITY TEST

3.7.1. Connect the black lead to the 'COM' input socket and the red lead to the V/Ω 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 'ºC' position and the LCD display will show the ambient temperature.

3.8.2. Insert the 'K' type thermocouple plug into the temperature socket on the front panel and 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

4.1. DC VOLTAGE

Range	Accuracy	Resolution
200mV	±0.5% of reading ±1 digit	100µV
2V	±0.5% of reading ±1 digit	1mV
20V	±0.5% of reading ±1 digit	10mV
200V	±0.5% of reading ±1 digit	100mV
1000V	±0.8% of reading ±2 digits	1V

Input impedance: 10MΩ for all ranges.
Overload protection: 250Vrms for 200mV range. 1000Vdc or 1000Vac peak for all other ranges.

4.2. AC VOLTAGE

Range	Accuracy	Resolution
200mV	±1.2% of reading ±3 digits	100µV
2V	±0.8% of reading ±3 digits	1mV
20V	±0.8% of reading ±3 digits	10mV
200V	±0.8% of reading ±3 digits	100mV
700V	±1.2% of reading ±3 digits	1V

Input impedance: 10MΩ for all ranges.
Frequency range: 40 - 400Hz
Indication: Average (rms of sine wave).
Overload protection: 250Vrms for 200mV range. 750Vrms or 1000V peak for all other ranges.

4.3. DC CURRENT

Range	Accuracy	Resolution
2mA	±0.8% of reading ±1 digit	1µA
20mA	±0.8% of reading ±1 digit	10µA
200mA	±1.5% of reading ±1 digit	100µA
10A	±2.0% of reading ±5 digits	10mA

Overload protection: 0.2A/250V fuse. 10A range unfused.
Max. input: mA ranges - 200mA
10A range - 10A continuous, 20A for 15 seconds **max**.

4.4. AC CURRENT

Range	Accuracy	Resolution
2mA	±1.2% of reading ±3 digits	1µA
20mA	±1.2% of reading ±3 digits	10µA
200mA	±2.0% of reading ±3 digits	100µA
10A	±3.0% of reading ±7 digits	10mA

Frequency range: 40 - 400Hz
Indication: Average (rms of sine wave).
Overload protection: 0.2A/250V fuse. 10A range unfused.
Max. input: mA ranges - 200mA
10A range - 10A continuous, 20A for 15 seconds **max**.

4.5. RESISTANCE

Range	Accuracy	Resolution
200Ω	±0.8% of reading ±3 digits	0.1Ω
2kΩ	±0.8% of reading ±1 digit	1Ω
20kΩ	±0.8% of reading ±1 digit	10Ω
200kΩ	±0.8% of reading ±1 digit	100Ω
2MΩ	±0.8% of reading ±1 digit	1kΩ
20MΩ	±1.0% of reading ±2 digits	10kΩ
200MΩ	±5.0% of (rdg - 1.0) ±10 digits	100kΩ

Max. open circuit voltage: 2.8V
Overload protection: 250Vrms ac.

4.6. CAPACITANCE

Range	Accuracy	Resolution
2000pF		1pF
20nF		10pF
200nF	±2.5% of reading ±5 digits	100pF
2µF		1nF
20µF		10nF

4.7. TEMPERATURE

Range	Accuracy	Resolution
-50 to +400ºC*	±0.75% of reading ±3ºC	1ºC
400 to 1000ºC*	±1.5% of reading ±15ºC	1ºC
0 to 40ºC**	±2ºC	1ºC

*Using thermocouple probe
**Using built-in temperature sensor.

4.8. Accuracy Calculation

Example: Test reading on 200Vdc range is 56.4V. Accuracy is '±0.5% of reading ±1 digit'.
Reading ±1 digit = 56.4 ±1on the last figure i.e. 56.3 to 56.5V.
±0.5% on this range gives 56.3 - 0.5% to 56.5 + 0.5% or 56.0 to 56.8V. Therefore the actual voltage lies between 56.0 and 56.8V.

Note: Accuracy is specified for a period of one year after calibration and at 18ºC to 28ºC 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 behind battery cover (see 5.2.).

5.2. If the battery sign ' [− +] ' appears on the LCD display, it indicates that the battery should be replaced. Remove the meter from the outer protective casing. Remove the battery cover retaining screw (behind base of meter stand) and slide off the battery cover. Replace the battery with one of the same type and size (9V PP3).

5.3. SPARE PARTS

TA97/TP - Temperature Probe MM19/F - Fuse, 200mA MM30/L - Set of Leads

6. DECLARATION OF CONFORMITY

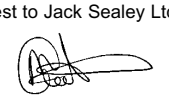
Declaration of Conformity We, the sole UK importer, declare that the product listed below is in conformity with the following standards and directives.

DIGITAL MULTIMETER
Model: MM402

89/336/EEC EMC Directive

CE

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  7th December 2001

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

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