

protech

# Multifunction Analogue Multimeter

HOBBYIST



**LIFETIME  
WARRANTY**

**CAT II  
1000V**

**AUDIBLE  
CONTINUITY**

**HFE  
TEST**

**DECIBEL  
TEST**



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# Multifunction Analogue

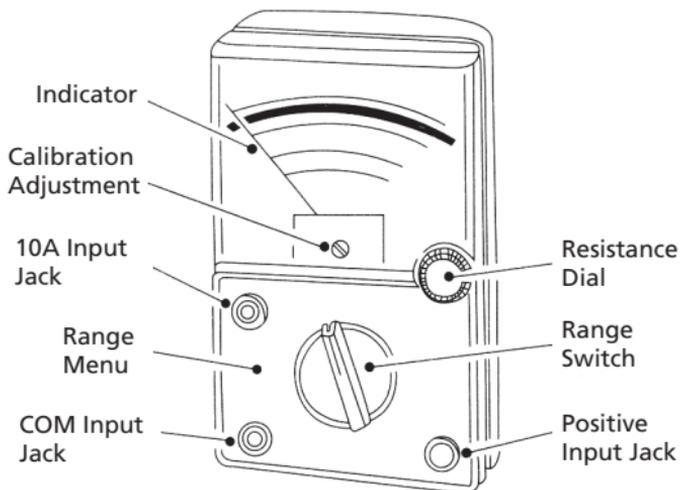
## Multimeter User Manual

Thank you for purchasing this Multifunction Analogue Multimeter. This multimeter is perfect for those who prefer to use a galvanometer (analogue moving coil meter) to take measurements. It can sometimes be more convenient to view an analogue dial over a digital display when values are fluctuating too. The 90 x 70mm display area ensures the printed, continuous scale is easy to read. With fuse and diode protection, 20 ranges and a protective rubber case - this multimeter is great for any level of experience.

Please familiarise yourself with the functions of the multimeter before use. We recommend retaining this manual for ease of reference.

- Improper use of this meter can cause damage, shock, injury or death.
- Always remove the test leads before replacing the battery or fuses.
- Before using the meter, please inspect the condition of the test leads and the meter itself for any damage. If damage is present, please discontinue use.
- Do not measure voltage if the voltage on the terminals exceeds 1000V above earth ground.
- Use great care if voltages are greater than 30VAC RMS. Anything above this is considered a shock hazard.
- Always discharge capacitors and disconnect power before performing diode, resistance or continuity tests.
- Remove the batteries from the meter if it will be unused for an extended period of time.

<b>FUNCTIONS</b>	
Basic Accuracy	3.000%
DC Voltage Range	100mV - 1000V
AC Voltage Range	10V - 1000V
DC Current Range	50 $\mu$ A - 250mA
Resistance	2k $\Omega$ - 20M $\Omega$
Continuity	Yes
Transistor Test	Yes
hFE Amplification Test	Yes
Diode Test	Yes



## **DC VOLTAGE MEASUREMENT**

- 1) Plug the red test lead into the positive socket.
- 2) Plug the black test lead into the -COM socket.
- 3) Set the range to the chosen DCV range position.
- 4) Connect the red test lead to the positive polarity of the circuit tested, and the black lead to the negative.
- 5) Read the DCV A scale (as per the reference table on page 7).

## **AC VOLTAGE MEASUREMENT**

- 1) Plug the red test lead into the positive socket.
- 2) Plug the black test lead into the -COM socket.
- 3) Set the range to the chosen ACV range position.
- 4) Connect the test leads to the circuit being tested. Polarity does not matter.
- 5) Read the ACV scale (as per the reference table on page 7).

## **AC VOLTAGE MEASUREMENT - ON OUTPUT TERMINAL**

- 1) Plug the red test lead into the output socket.
- 2) Plug the black test lead into the -COM socket.
- 3) Set the range to the chosen range position.
- 4) Connect the test leads to the circuit being tested and read the scale in the same manner as the previous ACV test.
- 5) This measurement is made to block the DC voltage so the AC voltage can be read alone.

## **DC CURRENT MEASUREMENT**

- 1) For measurements:
  - between 50 $\mu$ A and 250mA - place the red test lead in the positive socket and the black test lead into the -COM socket.
  - between 250mA and 10A - place the red test lead in the DC 10A Max socket and the black test lead into the -COM socket.
- 2) Set the range to the chosen DCA range position.
- 3) Connect the red test lead to the positive polarity of the circuit tested, and the black lead to the negative.
- 4) Read the DCV A scale (as per the reference table on page 7).

## **RESISTANCE MEASUREMENT**

- 1) Plug the test leads into the positive and COM sockets.
- 2) Place the range selector to the preferred range position.
- 3) Short the test leads and adjust the resistance dial so the indicator sits at the 0 position.
- 4) Make sure there is no voltage across the circuit to be tested.
- 5) Connect the test leads to the tested resistor, then read the scale in accordance with the reference table (on page 7).

## **TRANSISTOR TEST**

### ICEO leakage current test

- 1) Plug the test leads into the positive and -COM sockets.
- 2) Set the range selector to X10 (15mA) for small size transistors, or X1 (150mA) for large size transistors.
- 3) Adjust the resistance dial so the indicator points to 0 on the  $\Omega$  scale.
- 4) Connect the transistor to the multimeter:
  - i) When working with NPN transistors, ensure the 'N' terminal of the tester is connected with the Collector(C) of the transistor, and the 'P' terminal is connected with the Emitter(E) of the transistor.
  - ii) When working with PNP transistors, ensure the 'P' terminal of the tester is connected with the Collector(C) of the transistor, and the 'N' terminal is connected with the Emitter(E) of the transistor.
- 5) Read the iceo range. If the pointer is not within the LEAK zone, or the pointer moves up near the full scale, the transistor tested is not performing as designed.

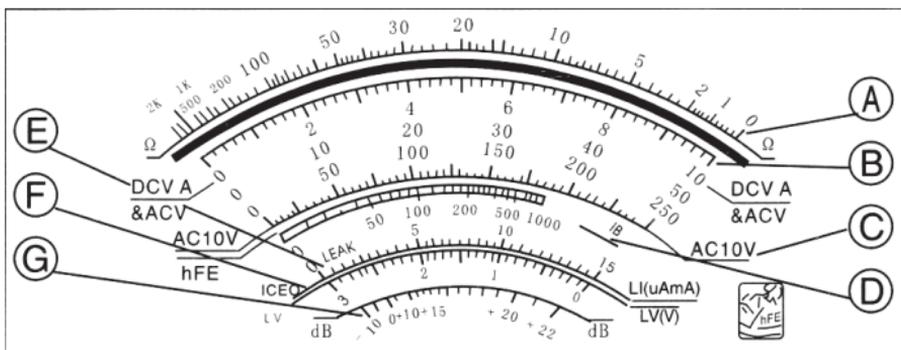
## **HFE (DC AMPLIFICATION) TEST**

- 1) Set the range selector to X10.
- 2) Adjust the resistance dial so the indicator sits at the 0 position.
- 3) Connect the transistor to the multimeter:
  - i) For NPN transistors, connect the 'P' terminal of the tester to the emitter of the transistor with the hFE test lead. Plug the hFE connector into the 'N' terminal, then connect its red clip to the collector, and the black clip to the base of the transistor.
  - ii) For PNP transistors, connect the 'N' terminal of the tester to the emitter of the transistor. Plug the hFE connector into the 'P' terminal, then connect its red clip to the collector, and the black clip to the base of the transistor.
- 4) Read the hFE scale. The value of the reading is  $I_c/I_b$ , which is the DC amplification degree of the transistor tested.

## DIODE TEST

- 1) Set the range selector to the required range position: X1k for 0-150 $\mu$ A, X10 for 0-15mA or X1 for 0-150mA.
- 2) Connect the diode to the multimeter.
  - i) For forward current tests - connect the 'N' terminal of the tester to the positive polarity of the diode, and the 'P' terminal to the negative polarity of the diode.
  - ii) For reverse current tests - connect the 'P' terminal of the tester to the positive polarity of the diode, and the 'N' terminal to the negative polarity of the diode.
- 3) Read the forward (IF) or reverse (IR) measurement on the LI section of the scale of the multimeter.
- 4) Read the linear (forward) voltage of the diode on the LV scale while testing IF or IR.

## MEASUREMENT SPECIFICATIONS



TEST	RANGE	SCALE	MULTIPLIER
DC Voltage	DC 0.1V 0.5V 10V 50V 250V 1000V	B 10 B 50 B 250 B 10 B 50 B 250 B 10	x 0.01 x 0.01 x 0.01 x 1 x 1 x 1 x 100
AC Voltage	AC 10V 50V 250V 1000V	C 10 B 50 B 250 B 10	x 1 x 1 x 1 x 100
DC Current	DC 50 $\mu$ A 2.55mA 25mA 0.25mA 10A	B 50 B 250 B 250 B 250 B10	x 1 x 0.01 x 0.1 x 0.001 x 1
Resistance	x 1 x 10 x 100 x 1k x 10k	A A A A A	x 1 x 10 x 100 x 1000 x 10000
Decibel	AC 10V 50V 250V	G G G	x 1 x 1 + 14dB x 1 + 28dB
Transistor Test	x 1 x 10	E E	x (for dig TR) x1 (for small TR)
hFE	x 10	D	x 1
Diode Test	x 1k x 10 x 1	E F E F E F	$\mu$ A x 10 x 1 mA x 1 x 1 mA x 10 x 10

## MAINTENANCE

### BATTERY INSTALLATION

To avoid the false readings, replace the battery as soon as you suspect the battery power to be low.

- 1) Turn the power off and disconnect the test leads from the meter.
- 2) Open the rear battery cover with a screwdriver.
- 3) Remove the old battery and insert the new battery into the battery holder, observing the correct polarity.
- 4) Put the battery cover back in place and secure with the screws.

### SPECIFICATIONS

Security Class:	Cat II 1000V
Basic DCV Accuracy:	3.000%
DC Voltage:	100mV, 500mV, 2.5V, 10V, 50V, 250V, 1000V ( $\pm 3.0\%$ )
AC Voltage:	10V, 50V, 250V, 1000V ( $\pm 4.0\%$ )
DC Current:	50 $\mu$ A, 2.5mA, 25mA, 250mA ( $\pm 3.0\%$ )
Resistance:	2k $\Omega$ , 20k $\Omega$ , 200k $\Omega$ , 2M $\Omega$ , 20M $\Omega$ ( $\pm 3.0\%$ )
Measurement Type:	Average
Input Impedance:	10 $\Omega$
Dimensions:	150(L) x 100(W) x 35(H)mm
Weight:	280g
Battery Type:	1 x 9V (included) 2 x AA (included)

### BOX CONTENTS

- 1 x Multimeter
- 1 x Test Leads
- 1 x 9V Battery
- 2 x AA Batteries
- 1 x User Manual

## **WARRANTY**

This product is protected by a lifetime warranty (from the date of purchase) covering all product manufacturing defects/faults that may occur within this timeframe. This warranty does not cover damage caused by neglect, misuse, contamination, alteration, accident or abnormal conditions of operation or handling, including failures caused by use outside of the product's specifications, or the normal wear and tear of mechanical components.

In the event that you suspect your product is defective/faulty, cease using the product when the suspected defect/fault arises and return the product along with proof of purchase to the place of purchase or distributor for assessment. Distributor contact details are available on the last page of this manual.

If the assessment concludes that the product is indeed defective/faulty, the product will either be repaired or replaced at no cost to you.

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

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