

protech

# Autoranging True RMS IP67 Digital Multimeter

SPECIALIST



**LIFETIME  
WARRANTY**

**4000  
DISPLAY  
COUNT**

**CAT IV  
600V**

**RELATIVE  
MODE**

**DATA  
HOLD**



# Autoranging True RMS IP67

## Digital Multimeter User Manual

Thank you for purchasing this Autoranging True RMS IP67 Digital Multimeter. This true RMS multimeter will provide accurate readings, regardless of load type or current wave shape. The default autoranging setting makes measurements easy by automatically selecting the best range. Utilise the relative measurement function to reference new measurements against stored measurements and analyse differences. The double-molded case and IP67 rating ensure it will cope on the toughest of sites - this isn't a meter you need to treat gently!

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.
- Do not exceed the maximum limits of the input values shown in the specification tables on pages 10-14 of this manual.
- Remove the batteries from the meter if it will be unused for an extended period of time.
- Always turn the function switch to the off position when not in use.

FUNCTIONS	
Max. Display	4000 Count
Basic Accuracy	0.5%
DC Voltage Range	400mV - 1000V
AC Voltage Range	400mV - 1000V
DC Current Range	4mA - 10A
AC Current Range	4mA - 10A
Resistance	400Ω - 40MΩ
Capacitance (CAP)	4nF - 100μF
Frequency (Hz)	Up to 10MHz

FUNCTIONS	
Continuity	Yes
Data Hold	Yes
Relative Measurement	Yes
Diode Test	Yes
Duty Cycle	Yes
Autoranging	Yes
LCD Backlight	Yes
Auto Power Off	Yes



The fuse & battery compartment are at the rear of the multimeter.

## FUNCTIONS

Autoranging/ Manual	<p>The meter's default setting is autoranging. This automatically selects the best range for the selected test/measurement.</p> <ul style="list-style-type: none"><li>• To set the meter to manual, press the "RANGE" button. The AUTO icon on the screen will turn off.</li><li>• Press the "RANGE" button to move through the available ranges until you see the range you want.</li><li>• To exit manual mode and return to autoranging, press and hold the "RANGE" button for 2 seconds.</li></ul>
Mode	<p>The "MODE" button helps you to move through various operations with various icons displayed on-screen. It works in conjunction with the function switch to measure things like resistance, diode, continuity and capacitance. It also allows you to select between AC or DC current measurements.</p>
Function Switch	<p>Select a measurement range by turning the switch to the preferred option.</p>
LCD Screen	<p>Readings and measurements taken by the multimeter will display in this area.</p>
Backlight	<ul style="list-style-type: none"><li>• Press the BACKLIGHT button to light up the LCD screen.</li><li>• The backlight will automatically turn off after 2-3 minutes.</li><li>• Once backlight is OFF, press the BACKLIGHT button to restart backlight timer and turn ON backlight for the LCD.</li></ul>
Relative Button	<p>This allows you to make measurements relative to a stored reference value. The displayed value is then the difference between the referenced (stored) value and the measured value.</p> <ul style="list-style-type: none"><li>• Press the REL button to store a reading. The REL indicator will appear on the display.</li><li>• The display will now indicate the difference between the stored value and the measured value.</li><li>• Press the REL button to exit the relative mode.</li></ul>

Hz/%Duty Button	<ul style="list-style-type: none"> <li>• Press the button to choose frequency or duty cycle in the range of frequency.</li> <li>• Press the button to measure frequency or duty cycle while measuring voltage or current. Refer to the table on page 14 for suggested frequency ranges.</li> <li>• Press the button again to return to measuring voltage or current.</li> </ul>
Data Hold	<ul style="list-style-type: none"> <li>• Press the the HOLD button to hold a measurement on-screen for reference at a later time. 'HOLD' will display on the screen.</li> <li>• Press the HOLD button again to return back to normal measurements.</li> </ul>
Input Jacks	<ul style="list-style-type: none"> <li>• VΩCAP: Positive input terminal.</li> <li>• COM: Negative input terminal.</li> <li>• μA mA: Positive input terminal.</li> <li>• 10A: Positive input terminal for 10A currents.</li> </ul>
Auto Power Off	The auto power off feature will turn the meter off after 15 minutes of inactivity.
Low Battery Indication	BAT will appear on screen when the battery voltage drops below the operating level.

SYMBOL	DESCRIPTION
	Continuity
	Diode Test
BAT	Low Battery
AC	Alternating Current / Voltage
AUTO	Autoranging
DC	Direct Current / Voltage
HOLD	Display Hold

## 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.

- 1) Set the function switch to the V DC position ("mV" will appear in the display).
- 2) Insert the black test lead banana plug into the negative (COM) jack.
- 3) Insert the red test lead banana plug into the positive (VΩCAP) jack.
- 4) Touch the test probe tips to the circuit under test. Be sure to observe the correct polarity (red lead to positive, black lead to negative).
- 5) Read the voltage in the display. The display will indicate the proper decimal point and value. If the polarity is reversed, the display will show (-) minus before the value.

## AC VOLTAGE MEASUREMENT

**CAUTION:** 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. 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.

- 1) Set the function switch to the VAC position.
- 2) Insert the black test lead banana plug into the negative (COM) jack.
- 3) Insert red test lead banana plug into the positive (V $\Omega$ CAP) jack.
- 4) Touch the test probe tips to the circuit under test.
- 5) Read the voltage in the display. The display will indicate the proper decimal point, value and symbol (AC, V, etc).

## **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.

- 1) Insert the black test lead banana plug into the negative (COM) jack.
- 2) For current measurements up to:
  - 4000 $\mu$ A DC - set the function switch to the  $\mu$ A position and insert the red test lead banana plug into the ( $\mu$ A) jack.
  - 400mA DC - set the function switch to the mA range and insert the red test lead banana plug into the (mA) jack.
  - 10A DC - set the function switch to the A position and insert the red test lead banana plug into the 10A jack.
- 3) Press the mode button until "DC" appears in the display.
- 4) Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
- 5) Touch the black test probe tip to the negative side of the circuit.
- 6) Touch the red test probe tip to the positive side of the circuit.
- 7) Apply power to the circuit.
- 8) Read the current in the display. The display will indicate the proper decimal point, value and symbol.

## **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.

- 1) Insert the black test lead banana plug into the negative (COM) jack.
- 2) For current measurements up to:

- 4000 $\mu$ A AC - set the function switch to the  $\mu$ A position and insert the red test lead banana plug into the ( $\mu$ A) jack.
  - 400mA AC - set the function switch to the mA range and insert the red test lead banana plug into the (mA) jack.
  - 10A AC - set the function switch to the A position and insert the red test lead banana plug into the 10A jack.
- 2) Press the MODE button until "AC" appears in the display.
  - 3) Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
  - 4) Touch the black test probe tip to the negative side of the circuit. And touch the red test probe tip to the positive side of the circuit.
  - 5) Apply power to the circuit. Read the current in the display. The display will indicate the proper decimal point, value and symbol.

## 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.

- 1) Set the function switch to the  $\Omega$  position.
- 2) Insert the black test lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the (+) jack (V $\Omega$ CAP).
- 3) Touch the test probe tips across the circuit or part under test. It is best to disconnect one side of the part under test so the rest of the circuit will not interfere with the resistance reading.
- 4) Read the resistance in the display. The display will indicate the proper decimal point, value and symbol.

## CONTINUITY CHECK

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

- 1) Set the function switch to the  position.
- 2) Insert the black lead banana plug into the negative (-) jack (COM).
- 3) Insert the red test lead banana plug into the positive (+) jack (V $\Omega$ CAP).
- 4) Press the  button until the  symbol appears in the display.
- 5) Touch the test probe tips to the circuit or wire you wish to check.
- 6) If the resistance is less than approximately 150 $\Omega$ , the audible signal will sound. The display will also show the actual resistance.

## DIODE TEST

**WARNING:** To avoid electric shock, do not test any diode that has voltage on it.

- 1) Set the function switch to  $\rightarrow \text{+} \text{~} \text{~} \text{~}$  position.
- 2) Press the  $\rightarrow \text{+} \text{~} \text{~} \text{~}$  button until the  $\rightarrow \text{+}$  symbol appears in the display.
- 3) Insert the black test lead banana plug into the negative (-) jack (COM).
- 4) Insert the red test lead banana plug into the positive (+) jack (V $\Omega$ CAP).
- 5) Touch the test probe tips to the diode or semiconductor junction you wish to test. Note the meter reading.
- 6) Reverse the probe polarity by switching probe position. Note this reading.
- 7) The diode or junction can be evaluated as follows:
  - A) If one reading shows a value and the other reading shows OL, the diode is good.
  - B) If both readings show OL, the device is open.
  - C) If both readings are very small or 0, the device is shorted.

**NOTE:** the value indicated in the display during the diode check is the forward voltage.

## CAPACITANCE MEASUREMENTS

**WARNING:** To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any capacitance measurements. Remove the batteries and unplug the line cords.

- 1) Set the function switch to the CAP position ("nF") and a small value will appear in the display).
- 2) Insert the black test lead banana plug into the negative (-) jack (COM).
- 3) Insert the red test lead banana plug into the positive (+) jack (V $\Omega$ CAP).
- 4) Touch the test leads to the capacitor to be tested. The display will indicate the proper decimal point, value and symbol.

## FREQUENCY MEASUREMENT

- 1) Set the function switch to the FREQ position.
- 2) Insert the black test lead banana plug into the negative (-) jack (COM).
- 3) Insert the red test lead banana plug into the positive (+) jack (V $\Omega$ CAP).
- 4) Touch the test probe tips to the circuit under test.
- 5) Read the frequency in the display. The digital reading will indicate the proper decimal point, symbols (Hz, kHz) and value.

## MEASUREMENT SPECIFICATIONS

The following guide is based on an environmental temperature of 18-28°C and humidity <70%.

### DC VOLTAGE

RANGE	RESOLUTION	ACCURACY
400mV	0.1mV	±(0.5% reading + 2 digits)
4V	1mV	±(1.2% reading + 2 digits)
40V	10mV	
400V	100mV	
1000V	1V	±(1.5% reading + 2 digits)

Input Impedance: 7.8MΩ

Max. Input Voltage: 1000V DC

### AC VOLTAGE

RANGE	RESOLUTION	ACCURACY
400mV	0.1mV	±(1.5% reading + 70 digits)
4V	1mV	±(1.2% reading + 3 digits)
40V	10mV	±(1.5% reading + 3 digits)
400V	100mV	
1000V	1V	±(2.0% reading + 4 digits)

Input Impedance: 7.8MΩ

Max. Input Voltage: 1000VAC RMS

Frequency Range: 50~400Hz

All AC voltage ranges are specified from 5% to 100% of range.

All AC voltages are autoranging except for 400mV.

## DC CURRENT

RANGE	RESOLUTION	ACCURACY
400 $\mu$ A	0.1 $\mu$ A	$\pm$ (1.0% reading + 3 digits)
4000 $\mu$ A	1 $\mu$ A	$\pm$ (1.5% reading + 3 digits)
40mA	10 $\mu$ A	
400mA	100 $\mu$ A	
10A	10mA	$\pm$ (2.5% reading + 5 digits)

Overload Protection: 0.5A/1000V and 10A/1000V fuse

Maximum Inputs: 400mA DC RMS on  $\mu$ A/mA ranges, 10A DC RMS on 10A range. All  $\mu$ A and mA DC currents are autoranging.

## AC CURRENT

RANGE	RESOLUTION	ACCURACY
400 $\mu$ A	0.1 $\mu$ A	$\pm$ (1.5% reading + 5 digits)
4000 $\mu$ A	1 $\mu$ A	$\pm$ (1.8% reading + 5 digits)
40mA	10 $\mu$ A	
400mA	100 $\mu$ A	
10A	10mA	$\pm$ (3.0% reading + 5 digits)

Overload Protection: 0.5A/1000V and 10A/1000V fuse

Frequency Range: 50~400Hz

Maximum Inputs: 400mA AC RMS on  $\mu$ A/mA ranges, 10A AC RMS on 10A range. All  $\mu$ A and mA AC currents are autoranging.

## RESISTANCE

RANGE	RESOLUTION	ACCURACY
400Ω	0.1Ω	±(1.2% reading + 4 digits)
4kΩ	1Ω	±(1.0% reading + 2 digits)
40kΩ	10Ω	± (1.2% reading + 2 digits)
400kΩ	100Ω	
4MΩ	1kΩ	
40MΩ	10kΩ	± (2.0% reading + 3 digits)

Input Protection: 600VDC or 600VAC RMS

## CAPACITANCE

RANGE	RESOLUTION	ACCURACY
4nF	1pF	±(5.0% reading + 0.1nF)
40nF	10pF	±(5.0% reading + 7 digits)
400nF	0.1nF	±(3.0% reading + 5 digits)
4μF	1nF	
40μF	10nF	
100μF	0.1μF	±(5.0% reading + 5 digits)

Overload Protection: 600VDC or 600VAC RMS

## DUTY CYCLE

RANGE	RESOLUTION	ACCURACY
0.1~99.9%	0.1%	±(1.2% reading + 2 digits)

Pulse Width: >100μs, <100ms

Frequency Width: 5Hz-150kHz

Sensitivity: >0.8V RMS

Overload Protection: 600VDC or 600VAC RMS

## DIODE TEST

TEST CURRENT	RESOLUTION	ACCURACY
0.3mA typical	1mV	±(10% reading + 5 digits)

Open Circuit Voltage: 1.5V DC typical

Overload Protection: 600VDC or 600VAC RMS

## FREQUENCY

RANGE	RESOLUTION	ACCURACY
9.999Hz	0.001Hz	±(1.5% reading + 5 digits)
99.99Hz	0.01Hz	
999.9Hz	0.1Hz	±(1.2% reading + 3 digits)
9.999kHz	1Hz	
99.99kHz	10Hz	
999.9kHz	100Hz	
9.999MHz	1kHz	±(1.5% reading + 4 digits)

Overload Protection: 600VDC or 600VAC RMS

Sensitivity: >0.8V RMS while ≤1MHz, >3V RMS while >1MHz

## AUDIBLE CONTINUITY

THRESHOLD	TEST CURRENT
Less than 150Ω	<0.3mA

Overload Protection: 600VDC or 600VAC RMS

## HZ% DUTY BUTTON RANGES

RANGE	RESOLUTION	ACCURACY
4V	$\geq 1.5V_{rms}$	5Hz~10kHz
40V, 400V	$\geq 10V_{rms}$	5Hz~20kHz
	$\geq 20V_{rms}$	5Hz~200kHz
1000V/1000V	$\geq 420V_{rms}$	50Hz~1kHz
400mA	$\geq 45mA_{rms}$	5Hz~5kHz
10A	$\geq 4A_{rms}$	4Hz~1kHz

## MAINTENANCE

### BATTERY INSTALLATION

To avoid the false readings, replace the battery as soon as the low battery power indicator appears.

- 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, secure with the screws.

### REPLACING FUSES

- 1) Turn power off and disconnect the test leads from the meter.
- 2) Remove the cover.
- 3) Gently remove the old fuse and install the new fuse into the holder.
- 4) Always use a fuse of the proper size and value (0.5A/1000V fast blow for the 400mA range, 10A/1000V fast blow for the 10A range).
- 5) Replace and secure the cover.

## **SPECIFICATIONS**

Enclosure:	Double-molded
Display:	4,000 count LCD display
Over Range Indication:	"OL" is displayed
Auto Power:	15 min (approx)
Polarity:	Automatic, minus (-) sign for negative
Low Battery Indication:	BAT is displayed if battery voltage drops below operating voltage
Battery:	1 x 9V
Operating Temperature:	0°C to 50°C
Storage Temperature:	-20°C to 60°C
Operating Humidity:	<70%
Storage Humidity:	<80%
Operating Altitude:	2000m maximum
Weight:	375g
Size:	182(L) x 82(W) x 55(H)mm

## **BOX CONTENTS**

- 1 x Multimeter
- 1 x Test Leads
- 1 x Carry Case
- 1 x 9V Battery
- 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.

Distributed by:  
Electus Distribution Pty. Ltd.  
320 Victoria Rd, Rydalmere  
NSW 2116 Australia

[www.electusdistribution.com.au](http://www.electusdistribution.com.au)

Made in China