

Autoranging True RMS Non-Contact Voltage Detection

Digital Multimeter User Manual

TECHNICIAN





QM-1321

Autoranging True RMS Non-Contact Voltage Detection

Digital Multimeter

User Manual

Thank you for purchasing this Autoranging True RMS Non-Contact Voltage Detection Digital Multimeter. The multimeter measures AC/DC voltage, AC/DC current, resistance, continuity, capacitance, frequency and temperature. It also features non-contact voltage detection, and diode & transistor testing. With a lifetime guarantee, it's the perfect multimeter for apprentices and novice hobbyists.

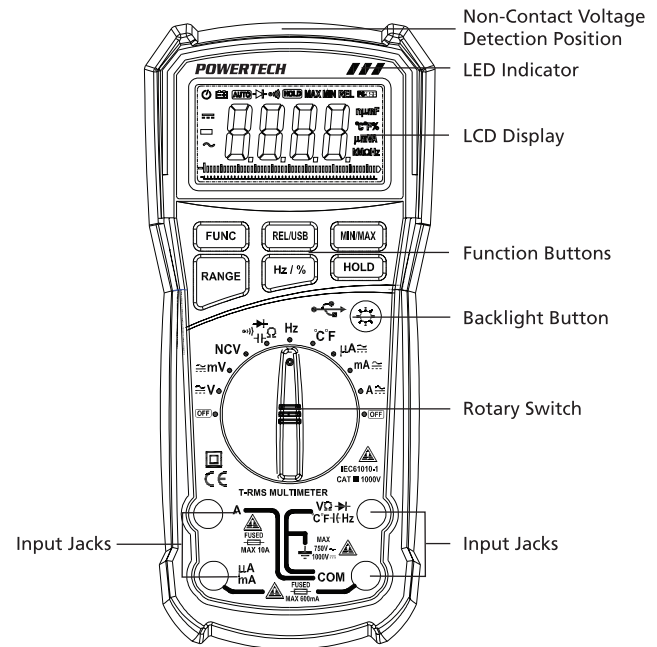
Please familiarise yourself with the functions of the multimeter before use. We recommend keeping this manual for ease of reference.

- 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 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 table on page shown in the specification tables on pages 12-14 of this manual.
- Remove the batteries from the meter if it will be unused for an extended period of time.

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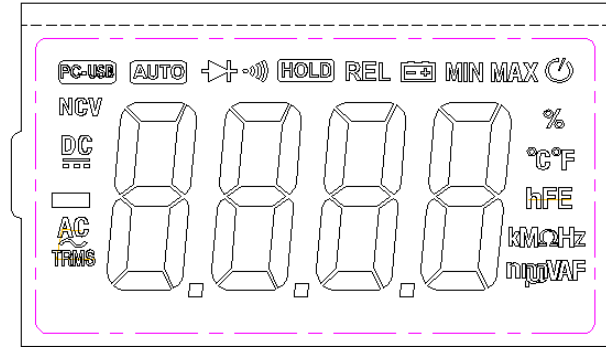
FUNCTIONS	
Max. Display	4000 Count
Basic Accuracy	0.5%
DC Voltage Range	40mV-1000V
AC Voltage Range	40mV-750V
DC Current Range	400 μ A-10A
AC Current Range	400 μ A-10A
Resistance	400 Ω - 40M Ω
Capacitance (CAP)	10nF-100mF
Frequency (Hz)	10Hz-10MHz
Transistor hFE Test	Yes
Diode Test	Yes
Continuity Check	Yes
Duty Cycle	Yes
NCV (Non-Contact Voltage) Detection	Yes
LINE (Live Wire Recognition) Test	Yes
Max. Input Protection	Yes
Relativity (Zero)	Yes
LCD Backlight	Yes



The tilt stand & battery compartment are at the rear of the multimeter.



FUNCTIONS	
NCV Detection	<ul style="list-style-type: none"> • Move the rotary switch to NCV. • When voltage is detected, the alarm will sound and the LED indicator will flash.
LED Indicator	<ul style="list-style-type: none"> • Flashes when voltage is detected. • Will flash faster if voltage detected is increasing.
LCD Display	<ul style="list-style-type: none"> • Readings and measurements taken by the multimeter appear in this area. • Press the backlight button to turn the light on.
Function Buttons	<ul style="list-style-type: none"> • FUNC: Use this button to switch between measuring DC/AC, resistance, continuity, diodes, celsius and Fahrenheit. • REL: Measures relative value with the REL sign displayed on screen. • MIN/MAX: Press the button once to display the minimum and maximum values on screen, and the difference between the two. Press the button again to remove from display. • RANGE: Measure voltage and resistance automatically or manually. Default is automatic, press the RANGE button again to manually measure. Press again to switch back to automatic mode. • Hz / %: Measure frequency and duty cycle. • HOLD: Press the button to lock readings as displayed on screen. Press again to unlock.
Backlight Button	<ul style="list-style-type: none"> • Press to turn the backlight on. • Light will remain on for approximately 10 seconds.
Rotary Switch	Select a measurement range by turning the switch to the preferred option.
Input Jacks	<ul style="list-style-type: none"> • V/Ω: Positive input terminal for voltage resistance, diode, temperature, frequency and capacitance. • COM: Negative input terminal for voltage, resistance, diode, temperature, frequency and capacitance. • mA: Input terminal for < 600mA current. • A: Input terminal for 10A current.



SYMBOL	DESCRIPTION
(HOLD)	Data Hold
▶	Diode Test
MAXH	Max. Value Hold
NCV	Non-Contact Voltage Detection
mV V	Unit of Voltage
Hz kHz MHz	Unit of Frequency
k Ω M Ω	Unit of Resistance
hFE	Transistor
TRMS	True RMS Measurement
%	Duty Cycle Measurement
⊖+	Low Voltage Indication
⋯)	Low Pass Filter Function



SYMBOL	DESCRIPTION
LPF	Low Pass Filter Function
INR	Inrush Current
μ A mA A	Unit of Current
pF nF μ F mF	Unit of Capacitance
μ H mH H	Unit of Inductance
°C	Degrees Celsius Temperature
°F	Degrees Fahrenheit Temperature
REL	Relative Value Measuremt

AC & DC VOLTAGE MEASUREMENT

To avoid electrical shock and/or damage to the multimeter, do not attempt to take any voltage measurements that might exceed 1000VDC or 750VAC RMS, and do not apply more than 1000VDC or 750VAC RMS between the common terminal and the earth ground. Unstable display may occur, especially at the low voltage range measurement. If an erroneous reading is suspected, short the V jack and COM jack and make sure zero is displayed on screen.

- 1) Set the rotary switch to the voltage position (\sim mV / \sim V).
- 2) Insert the black test lead banana plug into the negative COM jack.
- 3) Insert the red test lead banana plug into the positive V/ Ω jack.
- 4) Touch the black test probe tip to the negative side of the circuit.
- 5) Touch the red test probe tip to the positive side of circuit.
- 6) Read the voltage on screen. The polarity of the red test lead will display when making DC Voltage measurement.

CURRENT MEASUREMENT

Use the proper terminals, function and range for any current measurement. Never attempt measurement if potential for an open circuit to earth is greater than 250V. Do not place the test leads in parallel with a circuit or component when the test leads are plugged into the current terminals.

- 1) Disconnect power from the circuit to be tested and discharge the capacitors.
- 2) Set the rotary switch to current measuring range.
- 3) For current measurements:
 - less than 400mA - insert black test lead banana plug into the negative COM jack.
 - between 400mA to 10A - insert the red test lead banana plug into the mA jack.
- 4) To break the circuit under test, connect the black test lead to the more negative side of the break, and connect the red test lead to the more positive side of the break.
- 5) Connect power to the circuit being tested and read the value on screen. If OL displays, the input is over range, so you will need to select the higher range.
- 6) Disconnect power from the circuit to be tested, then discharge all capacitors. Remove the test leads and recover the measured circuit.

DIODE TEST & CONTINUITY CHECK

To avoid electric shock, disconnect power to the unit under test, discharge all capacitors before taking diode test and never measure continuity on circuits of wires that have voltage on them. In a circuit, a good diode should produce a forward bias reading of voltage, however, the reverse-bias reading can be variable based on the resistance of other pathways between the probe tips.

- 1) Set the rotary switch to the \rightarrow Ω position and press the FUNC button until the relevant icon appears on the screen.
- 2) Insert the black test lead banana plug into the negative COM jack.
- 3) Insert the red test lead banana plug into the positive V jack.
- 4) Place the red test lead on the anode of diode and black test lead on the cathode of diode. The meter will show the approx. forward voltage of diode. Reverse voltage will indicate OL.
- 5) Touch the test probe tips to the circuit or wire you wish to check. The maximum value of resistance under check will appear on the screen. If the resistance is less than 30 Ω , the audible signal will sound.



RESISTANCE MEASUREMENT

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. The measured value of a resistor in a circuit is usually different from the rated value of resistor. This is because the test current of the meter flows through all possible paths between the probe tips. In order to ensure the best accuracy when measuring low resistance, short the test leads before the measurement and subtract this resistance value from the total. For high resistance measurement, the meter may take a few seconds to stabilise the readings. In an open circuit, the meter will display OL to indicate over range.

- 1) Set the rotary switch to the Ω position and press the "FUNC" button until the relevant icon appears on the screen.
- 2) Insert the black test lead banana plug into the negative COM jack.
- 3) Insert the red test lead banana plug into the positive V jack.
- 4) Touch the test probe tips across the circuit or the part under test. It's best to disconnect one end of the circuit so the rest of the circuit will not interfere with the resistance reading.
- 5) Read the resistance displayed on screen.

CAPACITANCE MEASUREMENT

To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any capacitance measurements. The test may take more time for large capacitors, so wait until the readings settle before ending the test. To improve the accuracy of measurement less than 10nF, subtract the residual capacitance of the meter and test leads.

- 1) Set the rotary switch to Ω position and press the "FUNC" button until the relevant icon appears on the screen.
- 2) Insert the black test lead banana plug into the negative COM jack.
- 3) Insert the red test lead banana plug into the positive V jack.
- 4) Touch the test leads to the capacitor to be tested and read the capacitance value in the display.

FREQUENCY (DUTY CYCLE) MEASUREMENT

To avoid electric shock, do not apply more than 250VDC or 250VAC RMS before taking frequency measurement.

- 1) Set the rotary switch to Hz/% position.
- 2) Insert the black test lead banana plug into the negative COM jack.
- 3) Insert the red test lead banana plug into the positive Hz jack.
- 4) Touch the test lead tips to the circuit under test.
- 5) Read the frequency value on screen.
- 6) Press the FUNC button to indicate "%".
- 7) Read the % duty cycle on screen.

TRANSISTOR hFE TEST

To avoid electric shock, do not apply more than 36VDC or 36VAC RMS between the hFE terminal and the COM terminal.

- 1) Set the rotary switch to hFE range.
- 2) Connect the COM and "+" plug of the special multi-function socket to the COM and V input jack.
- 3) Determine whether the transistor under test is NPN or PNP type and locate the emitter, base and collector leads.
- 4) Insert leads from the transistor into the relevant jacks of the special multifunction socket.
- 5) The meter will display the approx. hFE value on screen.

NCV (NON-CONTACT VOLTAGE) DETECTION

Due to external interference sources, this test may detect the wrong voltage. Please use as an estimate only. Detection may be interfered by socket design, insulation thickness and other variable conditions. External sources such as flashlights, motors, etc may interfere with reading and cause the wrong detection.

- 1) Set the rotary switch to NCV position and wait for EF to display on screen.
- 2) Contact the top part of meter with the circuit being tested.
- 3) The LED light will flash and an audible signal will sound, with the signal strength displayed on screen.



LINE (LIVE WIRE RECOGNITION) TEST

When serious circuit leakage is detected (approx. over 15V) and the red test lead is in contact with the earth line, the meter will buzz and the LED light will flash.

- 1) Set the rotary switch to LINE position.
- 2) Connect the black test lead to the COM jack and red test lead to the $V\Omega$ jack. Make sure to hold the insulation part of the black test lead and not plug it into the circuit under measurement.
- 3) Contact the red test lead to the wire. If it's live, the meter's buzzer will sound and the red LED light will flash.
- 4) If an earth connection is detected, the buzzer will not sound and LED light will not flash.

MAX/MIN

- 1) Press the MAX/MIN button to activate the MAX/MIN recording mode.
- 2) If the "MAX" icon appears on screen, the meter will display and hold the maximum reading, and update only when a new "max" occurs.
- 3) If the "MIN" icon appears on screen, the meter will display and hold the minimum reading, and update only when a new "min" occurs.
- 4) To exit MAX/MIN mode, press and hold the MAX/MIN button for 2 seconds.

RELATIVE MODE

The relative measurement feature allows you to make measurements relative to a stored reference value. A reference voltage, current, etc can be stored and measurements made in comparison to that value. The displayed value is the difference between the reference value and the measured value.

- 1) Press the REL button to store the reading displayed on screen. The REL indicator will appear on the screen as well. The difference between the stored value and measured value will also display on the screen.
- 2) Press the REL button to exit the relative mode.

DISPLAY BACKLIGHT

Press the button for 1 or 2 seconds to turn the screen backlight on or off. The backlight will automatically turn off after 10 seconds.

HOLD FUNCTION

The hold function freezes the reading that is displayed on screen. To activate or deactivate, simply press the HOLD button momentarily.

AUTO POWER OFF

The auto off feature will power down the meter after 15 minutes of inactivity. To disable the auto off feature, hold down the FUNC button to turn the meter on.

LOW BATTERY INDICATION

The icon will appear on the screen when battery power is low and needs replacing.

MEASUREMENT SPECIFICATIONS

The following guide is based on an environmental temperature of 18-28°C and humidity <80%.

DC VOLTAGE

RANGE	RESOLUTION	ACCURACY
40mV/60mV	0.01mV	$\pm(0.5\% \text{ reading} + 5 \text{ digits})$
400mV/600mV	0.1mV	$\pm(0.5\% \text{ reading} + 3 \text{ digits})$
4V/6V	0.001V	$\pm(0.8\% \text{ reading} + 3 \text{ digits})$
40V/60V	0.01V	
400V/600V	0.1V	$\pm(1.0\% \text{ reading} + 5 \text{ digits})$
1000V	1V	

Input Impedance: 10M Ω

Max. Input Voltage: 1000V DC



AC VOLTAGE

RANGE	RESOLUTION	ACCURACY
40mV/60mV	0.01mV	±(1.0% reading + 20 digits)
400mV/600mV	0.1mV	±(1.0% reading + 5 digits)
4V/6V	0.001V	±(0.8% reading + 5 digits)
40V/60V	0.01V	
400V/600V	0.1V	
750V	1V	±(1.0% reading + 5 digits)

Input Impedance: 10MΩ
 Max. Input Voltage: 750VAC RMS
 Frequency Range: 40~1000Hz

DC CURRENT

RANGE	RESOLUTION	ACCURACY
400μA/600μA	0.1μA	±(1.0% reading + 5 digits)
4mA/6mA	0.001mA	±(0.8% reading + 5 digits)
40mA/60mA	0.01mA	
400mA/600mA	0.1mA	
4A/6A	0.001A	±(1.0% reading + 10 digits)
10A	0.01A	

Overload Protection: fuse FF500mA/1000V for mA range, fuse FF10A/500V for 10A range.

AC CURRENT

RANGE	RESOLUTION	ACCURACY
400μA/600μA	0.1μA	±(1.2% reading + 5 digits)
4mA/6mA	0.001mA	
40mA/60mA	0.01mA	±(1.5% reading + 5 digits)
400mA/600mA	0.1mA	
4A/6A	0.001A	±(1.8% reading + 15 digits)
10A	0.01A	

Overload Protection: fuse FF500mA/1000V for mA range, fuse FF10A/500V for 10A range.
 Frequency Range: 40~1000Hz

RESISTANCE

RANGE	RESOLUTION	ACCURACY
400Ω/600Ω	0.1Ω	±(0.8% reading + 5 digits)
4kΩ/6kΩ	0.001kΩ	
40kΩ/60kΩ	0.01kΩ	
400kΩ/600kΩ	0.1kΩ	
4MΩ/6MΩ	0.001MΩ	
40MΩ/60MΩ	0.01MΩ	±(1.2% reading + 15 digits)

Overload Protection: 250VDC or 250VAC RMS

DIODE & CONTINUITY

RANGE	FUNCTION
	Display approximate forward voltage of diode
	Built-in buzzer will sound if resistance is less than 30Ω



FREQUENCY

RANGE	RESOLUTION	ACCURACY
10Hz	0.01Hz	±(0.5% reading + 2 digits)
100Hz	0.1Hz	
1kHz	0.001kHz	
10kHz	0.01kHz	
100kHz	0.1kHz	
1MHz	0.001MHz	
10MHz	0.01MHz	

Overload Protection: 250VDC or 250VAC RMS

CAPACITANCE

RANGE	RESOLUTION	ACCURACY
10nF	0.01nF	±(4.0% reading + 25 digits)
100nF	0.1nF	±(4.0% reading + 15 digits)
1μF	0.001μF	
10μF	0.01μF	
100μF	0.1μF	
1mF	1μF	±(5.0% reading + 25 digits)
10mF	10μF	
100mF	100μF	

Overload Protection: 250VDC or 250VAC RMS

TRANSISTOR HFE

RANGE	ACCURACY
hFE	Display approx. hFE value 1~1000 of transistor under test, base current approx. 1mA.

MAINTENANCE

BATTERY INSTALLATION

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

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

REPLACING THE FUSES

- 1) Turn power off and disconnect the test leads from the meter.
- 2) Remove the battery cover and battery.
- 3) Remove the screws securing the rear cover.
- 4) Gently remove the old fuse and install the new fuse into fuse holder.
- 5) Replace and secure the rear cover, battery and battery cover.





SPECIFICATIONS

Protection:	Overload, Full Range
Max. Input Voltage:	750VAC RMS / 1000VDC
Sampling Rate:	2/sec (approx.)
Operating Temperature:	0°C~40°C (32°F~104°F)
Operating Humidity:	< 80%RH
Storage Temperature:	-10°C~60°C (14°F~122°F)
Storage Humidity:	< 70%RH
Power Supply:	1 x 9V Battery
Dimensions:	200(H) x 92(W) x 60(D)mm
Weight:	230g (including battery)

BOX CONTENTS

- 1 x Autoranging Multimeter
- 1 x Test Leads
- 1 x Transistor Test Kit
- 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.



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