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# Duty Cycle & Temperature Digital Multimeter

TECHNICIAN

QM-1323



# Duty Cycle & Temperature

## Digital Multimeter User Manual

Thank you for purchasing this Duty Cycle & Temperature Digital Multimeter. This multimeter is packed with features at a very economical price point. The backlit screen displays readings for measurements such as non-contact voltage detection, duty cycle, capacitance and temperature. It's one of our most popular models.

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 11-15 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.

<b>FUNCTIONS</b>	
Max. Display	4000 Count
Basic Accuracy	0.5%
DC Voltage Range	400mV - 600V
AC Voltage Range	400mV - 600V
DC Current Range	400 $\mu$ A - 10A
AC Current Range	400 $\mu$ A - 10A
Resistance	400 $\Omega$ - 40M $\Omega$
Capacitance (CAP)	40nF - 100 $\mu$ F
Frequency (Hz)	Up to 10MHz
Temperature	Yes
Data Hold	Yes
Relative Measurement	Yes
Diode Test	Yes
Duty Cycle	Yes
Audible Continuity	Yes
NCV (Non-Contact Voltage Detection)	Yes
Auto Range	Yes
Manual Range	Yes
LCD Backlight	Yes
Auto Power Off	Yes





The tilt stand & 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> <p>Note: Manual ranging cannot be selected for capacitance and frequency measurements.</p>
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>
Hold & Backlight	<ul style="list-style-type: none"><li>• Press the HOLD button to lock readings as displayed on the screen. Press again to unlock.</li><li>• Press the HOLD button longer to turn the backlight on.</li><li>• Press the button longer again to turn the backlight off.</li></ul>
Relative Button	<ul style="list-style-type: none"><li>• Press the REL button to store a reading for referencing at a later date. Then reference any new inputs against the stored measurement.</li><li>• Press the REL button again to cancel the relative measurement function.</li></ul> <p>Note: Do not use for Hz/duty, diode and continuity measurements.</p>

Input Jacks	<ul style="list-style-type: none"> <li>• V<math>\Omega</math>TEMP: Positive input terminal for voltage resistance, diode, temperature, frequency and capacitance.</li> <li>• COM: Negative input terminal for voltage, resistance, diode, temperature, frequency and capacitance.</li> <li>• 10A: Input terminal for 10A current.</li> </ul>
Auto Power Off	The auto power off feature will turn the meter off after 30 minutes of inactivity.
Low Battery Indication	"BAT" will appear on the screen when battery power is low and requires replacement.
NCV Detection	When voltage is detected, the LED light will turn on.

<b>SYMBOL</b>	<b>DESCRIPTION</b>
	Continuity
	Diode Test
BAT	Low Battery
AC	Alternating Current/Voltage
AUTO	Autoranging
DC	Direct Current/Voltage
DATA HOLD	Data Hold

## **AC/DC VOLTAGE MEASUREMENT**

On some low AC & DC voltage ranges - when test leads are not connected to a device - the display on the screen may show a random, changing reading. This is normal and caused by the high-input sensitivity of the multimeter. When connected to a circuit, the multimeter will display a stabilised, accurate measurement.

- 1) Set the function switch to the VAC or VDC 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 V $\Omega$ TEMP jack.
- 4) Use the MODE button to select AC or DC voltage.
- 5) Touch the test probe tips to the circuit under test, making sure to observe the correct polarity.
- 6) Read the voltage in the display.
- 7) If the polarity is reversed, the screen will display a minus sign in front of the value.

## **DC CURRENT MEASUREMENT**

Do not measure 10A currents for longer than 30 seconds. Exceeding 30 seconds may cause damage to the meter and/or test leads.

- 1) Insert the black test lead banana plug into the negative COM jack.
- 2) For current measurements up to:
  - 4000A 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 position and insert the red test lead banana plug into the mA jack.
  - 10A DC - set the function switch to the 10A position and insert the red test lead banana plug into the 10A jack.
- 3) Press the MODE button to show "DC" on the screen.
- 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 displayed on the screen.


## AC CURRENT MEASUREMENT

Do not measure 10A currents for longer than 30 seconds. Exceeding 30 seconds may cause damage to the meter and/or test leads.

- 1) Insert the black test lead banana plug into the negative COM jack.
- 2) For current measurements up to:
  - 4000A AC - set the function switch to the  $\mu\text{A}$  position and insert the red test lead banana plug into the  $\mu\text{A}$  jack.
  - 400mA AC - set the function switch to the mA position and insert the red test lead banana plug into the mA jack.
  - 10A AC - set the function switch to the 10A position and insert the red test lead banana plug into the 10A jack.
- 3) Press the MODE button to indicate 'AC' on the screen.
- 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 displayed on the screen.

## RESISTANCE MEASUREMENT

To avoid electric shock, disconnect power to the test area and discharge all capacitors before taking any resistance measurements. Remove the batteries and unplug the line cords.

- 1) Set the function switch to the  $\Omega$   CAP 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  $V\Omega\text{TEMP}$  jack.
- 4) Press the MODE button until ' $\Omega$ ' displays on the screen.
- 5) Touch the test probe tips across the circuit or part being tested. It is best to disconnect one side of the part being tested so the rest of the circuit will not interfere with the resistance reading.
- 6) Read the resistance displayed on the screen.



## CONTINUITY CHECK

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

- 1) Set the function switch to the  $\Omega \rightarrow \text{+} \text{))}$  CAP 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  $V\Omega\text{TEMP}$  jack.
- 4) Press the MODE button until  $\text{))}$  displays on the screen.
- 5) Touch the test probe tips across the circuit or wire you want to check.
- 6) If the resistance is less than approximately 150 $\Omega$ , the audible signal will sound.

## DIODE TEST

The value that displays on-screen during the diode check is the forward voltage.

- 1) Set the function switch to the  $\Omega \rightarrow \text{+} \text{))}$  CAP 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  $V\Omega\text{TEMP}$  jack.
- 4) Press the MODE button until  $\rightarrow \text{+}$  displays on the screen.
- 5) Touch the test probes to the diode or semiconductor being tested.
- 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 zero, the device is shorted.

## CAPACITANCE MEASUREMENTS

To avoid electric shock, disconnect power to the area being tested and discharge all capacitors before taking any capacitance measurements.

- 1) Set the function switch to the  $\Omega \rightarrow \text{+} \text{))}$  CAP 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  $V\Omega\text{TEMP}$  jack.
- 4) Press the MODE button until 'nF' displays on the screen.
- 5) Touch the test leads to the capacitor being tested.
- 6) The test may take up to three minutes or more for large capacitors to charge. Wait until the readings settle before ending the test.
- 7) Read the capacitance value displayed on the screen.

## **TEMPERATURE MEASUREMENTS**



To avoid electric shock, disconnect both test probes from any source of voltage prior to taking a temperature measurement. Be sure you remove the thermocouple before changing to another measurement function.

- 1) Set the function switch to the temp position.
- 2) Insert the temperature probe into the input jacks, making sure to observe the correct polarity.
- 3) Press the MODE button to indicate '°F' or '°C'.
- 4) Touch the temperature probe head to the part you wish to measure. Ensure the probe remains in contact with the part until the reading stabilises (about 30 seconds).
- 5) Read the temperature displayed on the screen.
- 6) When setting celsius or fahrenheit in initial state, please remove the battery cover and move the C°/F° switch into the corresponding position.

## **FREQUENCY MEASUREMENT**

- 1) Set the function switch to the 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 VΩTEMP jack.
- 4) Touch the test probes to the circuit being tested.
- 5) Read the frequency displayed on the screen.

## DIODE & CONTINUITY

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

## DIODE TEST

TEST CURRENT	RESOLUTION	ACCURACY
0.3mA typical/open max 1.5V	1mV	$\pm(10\% \text{ reading} + 5 \text{ digits})$

Max Open Circuit Voltage: 1.5V

Overload Protection: 250VDC or 250VAC RMS

## AUDIBLE CONTINUITY

THRESHOLD	TEST CURRENT
Less than $150\Omega$	Maximum 0.3mA

## **MAINTENANCE**

### **BATTERY INSTALLATION**

To avoid the false readings, replace the battery as soon as BAT (low battery power indicator) appears on-screen.

- 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 battery 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/250V fast blow for the 400mA range, 10A/250V fast blow for the 10A range).
- 5) Replace and secure the cover.

## **SPECIFICATIONS**

Display:	4000 Count
Security Class:	Cat III 600V
Basic DCV Accuracy:	0.500%
DC Voltage:	400mV, 4V, 40V, 400V, 600V ( $\pm 0.5\%$ )
AC Voltage:	400mV, 4V, 40V, 400V, 600V ( $\pm 1.2\%$ )
DC Current:	4mA, 40mA, 400mA, 10A ( $\pm 2.5\%$ )
AC Current:	4mA, 40mA, 400mA, 10A ( $\pm 3\%$ )
Resistance:	400 $\Omega$ , 4k $\Omega$ , 40k $\Omega$ , 400k $\Omega$ , 40M $\Omega$ ( $\pm 1.2\%$ )
Frequency:	4nF, 40nF, 4 $\mu$ F, 40 $\mu$ F, 100 $\mu$ F ( $\pm 3\%$ )
Temperature:	-20°C to 760°C ( $\pm 3\%$ )
Measurement Type:	Average
Input Impedence:	10M $\Omega$
Dimensions:	138(H) x 68(W) x 37(D)mm
Weight:	210g
Battery Type:	1 x 9V

## **BOX CONTENTS**

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