



## Operating Manual Q 2004 Impedance Meter

### 1.0 FEATURES:

- Suitable for 50V, 70V and 100V line speaker systems up to 5kW
- Also suitable for measuring low Impedance speaker loads of 4 -16Ω
- OLED display shows Impedance and Wattage of the load
- 1Ω to 20KΩ test range
- Auto ranging
- Display accuracy +/-10%

- Push button operation
- System Check Mode (20, 60 or unlimited minutes)
- 5V Rechargeable Lithium Polymer internal battery
- Low battery indication
- Buzzer and Haptic feedback option via Menu access
- USB Charging lead supplied
- Silicon Test Leads supplied
- Soft Carry Case Included
- Rugged yet easy to hold compact hand held case

### 2.0 INTRODUCTION:

The Redback Impedance Meter is an absolute necessity for all PA system installers. An impedance meter is critical for accurately measuring low impedance loudspeaker systems, incorporating multiple speakers and crossovers, and for measuring commercial 70V or 100V line speaker systems, which may include many speakers with line transformers and several hundred meters of cable. Trying to measure this type of load is virtually impossible with a standard multimeter.

The Redback® Q 2004 measures and calculates loads for both 100V and 70V line systems up to 5k Watts in power. Most impedance meters on the market display the impedance in ohms, leaving the installer to calculate the system wattage. This impedance meter for 'dummies' designed and manufactured by Redback calculates and displays speaker loads in watts.

Measuring a transformer with a regular ohm meter or multimeter is very difficult and provides inaccurate results. This is because an ohm meter or multimeter uses DC to measure the resistance. Consider a transformer, which is basically a coil of wire, the DC resistance will be fairly low. If an AC signal is passed through the winding, the impedance will be much higher, unless the winding is shorted. In this case the reading will be very low.

In the case of a short circuit the inductance of the transformer tries to impede the current flow through the winding. The nature of transformers will result in the impedance being reflected into other windings on the transformer being tested. This means a shorted turn on any winding will show up on the other windings.

For example a short circuit on several hundred metres of cable will not show up as a short circuit on a standard multimeter. You will actually measure the DC resistance of the cable which will be around 22 ohms for 500 meters of 24/0.2 cable.

Using an impedance meter, measuring the AC resistance will read a short circuit. A short circuit located remotely in a speaker line is the major cause for amplifiers overheating and blowing DC fuses.

Shorted turns on mains transformers primary windings can also be measured with this meter. If this meter displays a value of less than 100 ohms, this will indicate that the transformer has a shorted turn.

# Redback® Q 2004 Impedance Meter

## 3.0 OPERATION:

### MENU OPTIONS

Press the "MENU" button to access the menu, and then press the "MENU" button repeatedly to scroll through the options. Press the "TEST" button to select the desired option.

There are four menu options available as outlined below.

#### BUZZER:

Use this option to enable a buzzer which sounds when the unit is testing. Press the "MENU" button repeatedly to scroll through the OFF and ON options and then press the "TEST" button to select.

#### HAPTIC:

Use this option to enable haptic feedback which vibrates the unit when testing. Press the "MENU" button repeatedly to scroll through the OFF and ON options and then press the "TEST" button to select.

#### VOLTS:

The Redback® Q 2004 impedance meter is suitable for 50V, 70V and 100V systems. Before measuring the impedance of a line, the voltage needs to be set via the Menu button to suit the system application.

*(Note: The voltage is set to 100V by default at the factory).*

Press the "MENU" button repeatedly to scroll through the voltage options and then press the "TEST" button to select.

#### SYS TIME:

This option is used to set the amount of time required when in "System Check Mode". Press the "MENU" button repeatedly to scroll through the time options, 20 minutes, 60 minutes and "None" and then press the "TEST" button to select the desired time. When the time is set to "None" the unit will stay in "System Check Mode" until the "TEST" button is pressed or the battery runs flat.

### TO MEASURE IMPEDANCE

*Make sure the amplifier has been completely disconnected from the speaker line to be measured.*

Connect the test leads to the Q 2004.

Connect the test leads to the speaker line.

Once your meter is connected press the TEST button for approximately 1 second. The impedance meter will display "TESTING PLEASE WAIT" for approximately 3 seconds while it checks the speaker load. You will be able to hear a tone from the speaker load that is under test. After 3 seconds the load impedance and wattage will be displayed on the LCD.

Figure 1 below lists the expected speaker line Impedances and their associated wattages for 70V and 100V systems.

So for a total load of 500 watts using 100V line transformer fitted speakers the impedance of the speaker load should be 20Ω. For a total load of 30W using 70V line transformer fitted speakers the impedance of the speaker load should be 156Ω and so on.



### About 70V & 100V Line Speaker Systems

**Wiring speakers in parallel for 70/100V line:** Where several speakers are to be used at one time, on one circuit, it becomes necessary to use speakers fitted with line-matching transformers. This is to overcome the effects of connecting speakers in parallel and cable losses. The amplifier generally has an output voltage of 100 volts (70 volts is typically used in North America, however operation is similar). In this configuration the total wattage load on the amplifier is derived from adding all the line transformer primary tap ratings together. For example, 70 one watt speakers will have a total speaker load of 70 watts. Or alternatively, it is conceivable to connect 100 one watt speakers to a 100 watt, 100 volt line amplifier.

**Measuring 70/100V Line Speaker Impedance:** To measure amplifier system load, you must use an impedance meter in order to measure the ac resistance of the connected speaker network. Impedance cannot be measured with a standard multimeter, as this measures the dc resistance.

Load	70V	100V
0.5W	9.4kΩ	20kΩ
0.66W	7.12kΩ	15kΩ
1W	4.7kΩ	10kΩ
1.25W	3.76kΩ	8kΩ
2W	2.35kΩ	5kΩ
2.5W	1.88kΩ	4kΩ
3W	1.56kΩ	3.3kΩ
5W	940Ω	2kΩ
7.5W	626Ω	1.3kΩ
10W	470Ω	1kΩ
15W	313Ω	666Ω
20W	235Ω	500Ω
30W	156Ω	333Ω
40W	117Ω	250Ω
60W	78Ω	166Ω
100W	47Ω	100Ω
125W	37Ω	80Ω
250W	19Ω	40Ω
500W	9.4Ω	20Ω

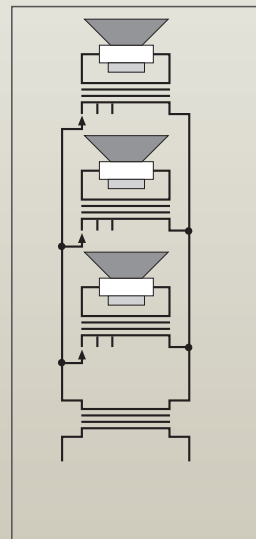


Fig 1. Measuring 70/100V Line Speaker Impedance

## SYSTEM CHECK MODE

System Check Mode is included for audible testing of larger speaker installations. It allows the Q 2004 to run at full output for a period of either 20 minutes, 60 minutes or continually (refer to the Menu options), so the installer can walk around the install to check sound is present on all speakers.

To activate this mode connect the test leads to the load to be checked, ensure that an amplifier is not connected. Make sure the Q 2004 is OFF then press the "TEST" button and hold for 5 seconds. "SYSTEM CHECK" will display on the LCD and a 1kHz tone will be put out the test leads.

The unit will stay in "System Check Mode" until the time elapses, the "TEST" button is pressed or the battery runs flat.

## SWITCHING OFF

To switch off the Q 2004 all you need to do is press the "TEST" button again. The LCD will display "POWER OFF" for a short time then the unit will power down. The Q 2004 is also equipped with an auto power off function. The unit will automatically power down after a period of 20 seconds in Single test mode and 30 minutes in System check mode, saving precious battery life.

## BATTERY CHARGING

"LOW BATTERY" will display on the LCD when the battery requires recharging.

To recharge the internal battery connect the supplied USB lead to a 5VDC USB source and connect the other end to the charging socket located on the top of the Q 2004.

(Replacement/and or extra lead Altronics part # P 6703)

"CHARGING" will display on the LCD along with the charge status. When the battery is charged, the unit will stop charging and display "CHARGE FINISHED" on the LCD. The charger can then be unplugged. The inbuilt charging circuit is a slow charger and will take up to 12 hours to charge a completely flat battery.



## NOTE:

- 1) The Q 2004 will not function as an Impedance meter when charging.
- 2) The charger can be removed at any time during charging though battery life will suffer.
- 3) The Q 2004 will still function when "LOW BATTERY" is being shown on the LCD but the measured results may be out by as much as 10%.

## REPLACEMENT PARTS

The Redback® Q 2004 Impedance Meter is supplied with a charging lead, a set of banana to crocodile clip leads and a soft carry case to house it all.

If replacements or spares are required they are all available from Altronics ([www.altronics.com.au](http://www.altronics.com.au)). The part numbers are as follows.

P 6703 - USB Type A Male To 1.35mm DC Plug lead (1m)

P 0405B - Silicon Test Leads - Banana Plugs To Croc Clips

Q 1056A - Multimeter Carry Case



# Redback® Q 2004 Impedance Meter

## 4.0 IMPORTANT GUIDELINES:

*Don't connect the meter to a line that has an amplifier attached to it. The impedance of the output transformer of an amplifier is extremely low and you could be easily be looking for a non-existing short.*

*Don't connect the meter to an active line. You will damage the meter with the applied voltage.*

*Don't continue to use a battery once the "LOW BATTERY" is being shown on the LCD. The readings you will get will be incorrect.*