

Microbial Fuel Cells (MFCs) generate maximum power when they are subjected to an external resistance that is equal to its own internal resistance. In this booklet you will learn how to find your MudWatt's internal resistance and maximize its power generation using the MudWatt™ Explorer Board.

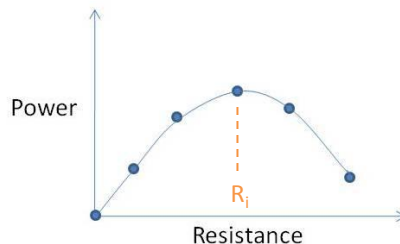
The MudWatt's internal resistance is a function of the ability of ions to diffuse through the mud from anode to cathode. The lower this internal resistance, the more power the MFC will produce. There are many ways to decrease this resistance, such as adding electrolytes (salts) to the mud and shortening the distance between the anode and cathode (of course, while still ensuring that there is enough distance to achieve suitable oxygen depletion at the anode).

To find the internal resistance of your MudWatt™, as well as its maximum power output, you will need to perform a technique called "potentiometry" (also referred to as a "Sweep"). This involves measuring the voltage output and calculating the power of your MudWatt™ over various resistances. When you plot your Power vs. Resistance, you will see a power curve as shown below, with the max power being produced at the value of your internal resistance (R_i):

You can calculate the power output by using ohm's law :

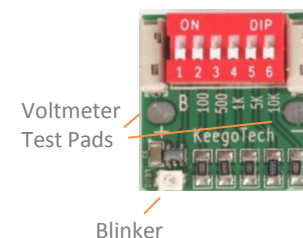
$$P = V^2/R$$

P = Power (Watts)
V = Voltage (Volts)
R = Resistance (Ohms)



Your MudWatt™ Explorer Board includes five resistances that can be easily switched on and off to perform a "Sweep". Instructions for performing a "Sweep" are provided on the next page.

The resistance for each Nob is outlined as follows (in Ohms):



- Nob #1= Blinker
- Nob #2 = 100
- Nob #3 = 500
- Nob #4 = 1000
- Nob #5 = 5000
- Nob #6 = 10,000

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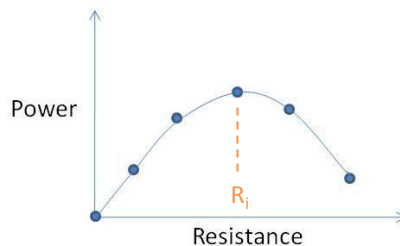
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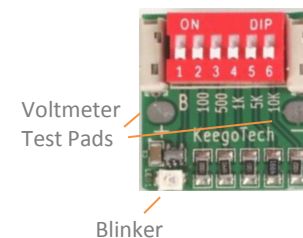
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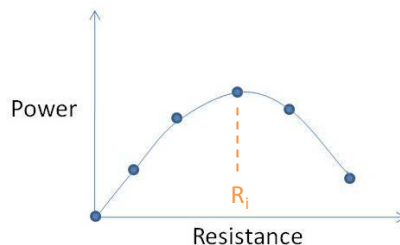
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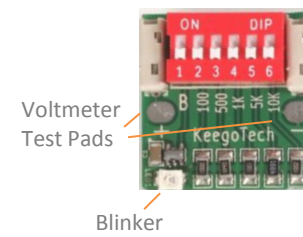
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Running your MudWatt™:

The MudWatt™ can be run in the Blinker mode (Nob #1) throughout the its lifetime. However, be sure that all other nob's are turned off while the Blinker is on.

Performing a Sweep:

- 1) To begin the sweep, switch the electronics panel to Open Circuit mode by turning all switches off, including the Blinker.
- 2) After 30 minutes, check the voltage across the two Test Pads using any voltmeter (black to “-”, and red to “+”). Record the voltage and the resistance (the resistance is infinite under Open Circuit mode)
- 3) Turning only one Nob on at a time, repeat Step 2 for the 5 different resistances provided on the Explorer Board.
- 4) Enter the data you’ve collected at www.keegotech.com/community/datashare

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Monitoring your MudWatt™:

Watch your MudWatt’s power grow and stabilize by performing a Sweep on it every week for the next two months.

Thank You!

With the data collected and submitted by you and your fellow Keegoites, we hope to uncover trends and peculiar behaviors of microbial fuel cell technology. . In this way, we aim to catalyze the development of this technology in the hope that someday MFCs will be a viable option in providing affordable and reliable energy for those who would benefit greatly from it. Developed by the public, for the public. All hail the Keegoites!



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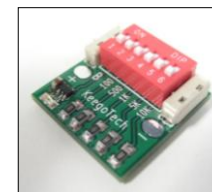
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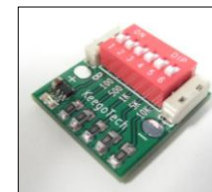
Maximizing Power: The Art of Potentiometry



This paper is Green Seal and Green-E Certified



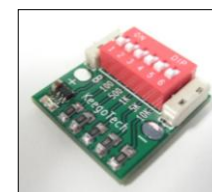
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