










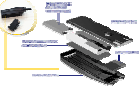






## MICRO FUEL CELLS – Operating Info.

| Company Name                             | Product   | Operating Temperature | Fuel Used                                    | Fuel Consumption (Flow) Rate | Operating Power Consumption | Start Up Time | Noise                                  | Life Span  | Maintenance Expectation  | Waste Heat/ Emissions | Picture   |
|--|---|-----------------------|--|------------------------------|-----------------------------|---------------|--|--|--|-----------------------|---|
| AER Energy Resources, Inc.               | Nokia phone prototype   |                       | Zinc-Air                                     |                              |                             |               |  |  |  |                       |    |
| <a href="#">Casio Computer Co., Ltd.</a> | High-Performance Fuel Cells for Portable Devices (Laptop)         |                       | Fuel Flexible (hydrocarbons, alcohols, etc.) |                              |                             |               |  |  |  |                       |    |
| Casio Computer Co., Ltd.                 | High-Performance Fuel Cells for Portable Devices (Digital Camera) |                       | Fuel Flexible (hydrocarbons, alcohols, etc.) |                              |                             |               |  |  |  |                       |    |
| Casio Computer Co., Ltd.                 | Micro reformer  |                       | Fuel Flexible (hydrocarbons, alcohols, etc.) |                              |                             |               |  |  |  |                       |   |
| <a href="#">Dais-Analytic</a>            | DAC-10  |                       | Hydrogen cylinder                            |                              |                             |               |  |  |  |                       |  |
| \Dais-Analytic                           | DAC-1   |                       | Hydrogen cylinder                            |                              |                             |               |  |  |  |                       |   |
| Dais-Analytic                            | DAC-15  |                       | Hydrogen cylinder                            |                              |                             |               |  |  |  |                       |   |
| Dais-Analytic                            | Fuel cell Radio   |                       |  |                              |                             |               |  |  |  |                       |   |
| <a href="#">Electric Fuel Corp.</a>      | INSTANT POWER™ products   | -10°C – +65°C         | Metallic zinc                                | 1.06 gm/Wh typical           | NA                          | Milliseconds  | Small commercial products : none       | Up to 9000 operating hours, depending on operating regime and conditions | Oxygen reduction cathodes have working life of up to 9000 hours. |                       |  |
| Electric Fuel Corp.                      | Primary zinc-air packs for military applications                  | -10°C – +65°C         | Metallic zinc                                | 1.06 gm/Wh typical           | N/A                         | Milliseconds  | Barely detectable micro-fan (optional) | Up to 9000 operating hours, depending on operating                       | Oxygen reduction cathodes have working life of up to 9000 hours. |                       |  |

|   |  |              |                                      |   |  |  |  | regime and conditions |  |   |   |
|---|--|--------------|--------------------------------------|---|--|--|--|-----------------------|--|---|---|
| <a href="#">Electro-Chem-Technic</a>                                    | FC03 PEM Fuel Cell System - 2 cell stack | 25 deg C     | Hydrogen supplied by flexible tubing |   |  |  |  | 5 - 30 min.           |  |   |    |
| <a href="#">Energy Visions, Inc.</a>                                    |  |              |                                      |   |  |  |  |                       |  |   |    |
| Fraunhofer Institute for Solar Energy Applications in Freiburg, Germany | Portable Fuel Cells (for notebooks)      |              | Hydrogen from hydride canisters      |   |  |  |  |                       |  |   |    |
| Fraunhofer Institute for Solar Energy Applications in Freiburg, Germany | Portable Fuel Cells (for camcorder)      |              | Hydrogen from hydride canisters      |   |  |  |  |                       |  |   |   |
| <a href="#">Fuel Cell Systems, Inc.</a>                                 | Mk2 module                               | 70 degrees C | Industrial grade hydrogen            | 0.27 Nm <sup>3</sup> /h (H <sub>2</sub> ); 2.4 Nm <sup>3</sup> /h (air) |  |  |  |                       |  | 0.24 l/h (max water production); Max 50 ppm CO <sub>2</sub> |   |
| <a href="#">Giner, Inc</a>  | Direct Methanol Fuel Cell                |              |                                      |   |  |  |  |                       |  |   |  |
| Giner, Inc  | Regenerative Fuel Cell                   |              |                                      |   |  |  |  |                       |  |   |  |
| Giner, Inc  | Reformate-Air Fuel Cell                  |              |                                      |   |  |  |  |                       |  |   |  |
| <a href="#">Greenvolt Power Corp.</a>                                   | PM-60 Emergency Fuel Cell Module         |              |                                      |   |  |  |  |                       |  |   |  |
| Greenvolt Power Corp.   | PM-120 Portable Fuel Cell Module         |              |                                      |   |  |  |  |                       |  |   |  |
|   | PM-135                                   |              |                                      |   |  |  |  |                       |  |   |   |



|  |                                       |   |                                     |  |  |  |  |                     |  |   |
|--|---------------------------------------|---|-------------------------------------|--|--|--|--|---------------------|--|---|
| Polyfuel, Inc.                                       | Rechargeable battery replacements     |   | Methanol solution                   |  |  |  |  |                     |  |    |
| PowerZinc Electric Inc.                              | PowerChip                             |   |                                     |  |  |  |  |                     |  |   |
| Protonex Technology Corp.                            |                                       |   | Hydrodes (<100W); Compress. (>100W) |  |  |  |  |                     |  |   |
| Samsung Advanced Research Institute of Technology    | DMFC Pack                             |   | Methanol                            |  |  |  |  |                     |  |   |
| <a href="#">Smart Fuel Cell GmbH</a>                 | DMFC for Cameras                      |   | 120 ml liquid methanol              |  |  |  |  |                     |  |    |
| Smart Fuel Cell GmbH                                 | DMFC for Traffic Lights               |   | 120 ml liquid methanol              |  |  |  |  |                     |  |    |
| Toshiba International Fuel Cell Corporation (w/ UTC) | Fuel Cell powered Genio (PDA)         | 25 to 30mW/cm-sq at cell temperatures between 30 to 40 degrees C, and 110mW/cm-sq at 90 degrees C | Methanol aqueous solution           |  |  |  |  | 40 hours continuous |  |    |
| <a href="#">Trimol Group Inc.</a>                    | Wireless Phone Aluminum-Air Fuel Cell | -20 to 60 degrees C   | Aluminum                            |  |  |  |  |                     |  |  |
| Trimol Group Inc.                                    | Portable PC Aluminum-Air Fuel Cell    | -20 to 60 degrees C   | Aluminum                            |  |  |  |  |                     |  |   |

Notice: For additional information or comments on Fuel Cells 2000's charts, contact Jennifer Gangi at: [jennifer@fuelcells.org](mailto:jennifer@fuelcells.org).