



## EDUCATIONAL PEM FUEL CELL RE510



**Year 1**  
study

### Features

- Demonstrates a High Watt Density PEM Fuel Cell, Generating Electrical Power Directly from Hydrogen.
- Brings the class room as close as possible to the contemporary advances in Fuel Cell technology.
- Integral Variable Load for Performance Investigation
- Power Output of up to 0.75kW
- Integral Computer Control, Safety System and Computer Interface. Software supplied.
- Minimal Operating Costs.
- Safe for Student Operation.

### Description

The fuel cell module incorporates a unique plate stack assembly with a highly intricate optimized internal fuel path geometry and specialized membrane and is mounted in a reinforced plastic panel with a transparent window that clearly shows the main components.

The educational unit is designed to allow the estimation of the exothermic heat generated in the stack as power is generated and water formed, and in addition to this, the instrumentation allows the key energy performance indicators e.g. power output, fuel consumption, efficiency, oxidant excess (air) etc. to be determined for the unit.

The hydrogen supply is internally pressure regulated, metered and controlled via an electronic valve. The heat generated during stack operation is ejected into the residual air in the coolant/oxidant stream which cools the cell. One particular advantageous feature of a single coolant/oxidant stream is that the system is thermally self regulating and thus intrinsically safe. The system has also been designed to ensure continual purging of the Fuel Cell and thus ensure optimal power output during use.

The software, supplied as standard, is used for the

smooth starting and stopping of the unit, changing between the internal load settings and provides full computerized data acquisition. A software controlled microprocessor allows the automated start-up and shut down of the system and also monitors for unsafe operating conditions.

A hydrogen leak detector monitors the unit and automatically shuts down the unit, well below the lower ignition limit for hydrogen.

The on board microprocessor regulates the airflow through the stack to match the loading conditions. A 15A (maximum) auxiliary socket is provided on the front of the panel to allow practically sized external load to be applied to the unit to investigate cell performance under varying load.

#### Related laws

- Engineering — all disciplines
- Technology — all disciplines
- Electronics
- Physical Sciences
- Environmental Conservation

#### Learning capabilities

- Measurement of the current density and voltage-current characteristics of a fuel cell.
- Measurement of power density from a fuel cell capable of up to 750W (1 HP) electrical output.
- Measurement and investigation of fuel cell efficiency with reference to fuel and air consumption, power output and heat losses.
- Measurement and display of key temperatures and fluid throughputs fuel stoichiometric and cooling circuits.
- Measurement and investigation of reactant utilization and transport phenomena.

#### Technical Specification

- Power output 0.75kW
- An all air system: no need for cooling water or heat exchangers.
- An ambient pressure system with integral fan.

- Utilisation of a single air stream: the coolant and oxidant streams are the same stream
- Operated at ambient temperature: -20°C to +52°C
- Stack temperature: +38°C to +66°C
- Compact Fuel Cell size: 103 x 352mm<sup>2</sup> footprint, 13kg weight.
- Ambient humidity operation: no additional humidification is required.
- An integral variable load, allowing the stack to be operated over its full capacity.

#### What's in the Box?

- 1 x RE510
- 3m Vent/drain hose
- 1 x 3m Inlet gas hose
- 1 x Automotive DC power plug
- 1 x Power lead
- 1 x Data Acquisition and Control software
- Instruction manual
- Packing list
- Test sheet
- Spare fuse
- 1 x Compact lamp

#### Minimum System Requirements

- USB enabled computer running Microsoft TM Windows (XP or later) operating system.

#### Weights & Dimensions

- Weight: 54 kg
- Length: 1060mm
- Width: 485mm
- Height: 885mm

#### Essential Services

- Hydrogen 99.95% pure (or better) at :
- 1.0 - 2.0 bar (maximum); 0-15LPM

#### Ordering information

To order this product, please call PA Hilton quoting the following code:  
RE510/230

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COUNTRY OF ORIGIN - UK WARRANTY PERIOD - 2 YEARS