



Hilton Educational Alkaline Fuel Cell RE520



- ▶ *Demonstrates an alkaline fuel cell, generating electrical power directly from hydrogen.*
- ▶ *Integral electronic control safety system and computer interface. Software supplied.*
- ▶ *Minimal operating costs.*
- ▶ *Safe for student operation.*
- ▶ *Two year warranty.*



Introduction

In our ever-growing technical climate, there are increasing references to hydrogen fuel cell applications in motor vehicles, static energy generation, space capsules and even mobile telephones.

The spectre of global warming and its effects are increasing the pressure for renewable and more ecologically friendly power supplies.

Hydrogen fuel cells will become increasingly important in years to come for a number of reasons.

- ◆ Hydrogen is the most abundant element in the universe.
- ◆ Hydrogen Fuel cell operation results in water as the only by-product.
- ◆ Totally silent in operation
- ◆ Requires little maintenance

The Hilton Educational Fuel Cell RE520 will provide interesting and instructive experimental work for all students, and will be of particular interest to those studying:

- **Environmental Engineering**
- **Electrical, Electronic Engineering**
- **Chemical Engineering**
- **Mechanical Engineering**
- **Electronics**
- **Fuel Technology**
- **Aerospace Engineering**
- **Automotive Engineering**
- **Plant & Process Engineering.**

Experimental Capabilities

- To demonstrate hydrogen air/O₂ and electrolyte operation.
- Measurement of output voltage and current.
- Measurement and display of key temperature and pressure.
- Demonstration of CO₂ removal from air.
- Relationship of power output to fuel flow.
- Relationship of air, hydrogen and electrolyte circulation.
- Monitoring of individual cell performance
- Relationship between electrolyte temperature and load.
- Identification of all stages of fuel cell operation.

Description

The fuel cell uses an alkaline liquid electrolyte as opposed to a solid polymer. The alkaline fuel cell will operate at typical internal ambient

temperatures and is at its most efficient at a maximum temperature of 70°C.

The educational unit and operating software, clearly demonstrates the fundamental principles of how and why the alkaline fuel cell works. The unit shows the three main chambers of the system;

- ◆ The air system - consisting of an air blower and a CO₂ absorber. Oxygen from the air is vital in the operation.
- ◆ The alkaline system - consisting of the tank, pump and various sensing devices.
- ◆ The Hydrogen system - consisting of gas, regulating, purging, and changeover valves. Nitrogen is also used through the Hydrogen gas lines to clean the electrodes of the fuel cell modules.

All three systems are brought together in the main component of the fuel cell where the chemical and electrical reactions take place. As the fuel cell goes through its stages of operation, monitoring of the fuel cell is carried out via the PC program. Once operational, the power output of the fuel cell can be measured and investigated using the integral internal load.

Power output may be varied and compared with fuel consumption, the data being automatically recorded for subsequent analysis.

Safety

The unit is provided with an integral flammable gas sensor, alarm and emergency shut down initiator. Ducted pressure relief valves and high pressure switches prevent over pressurisation and all control actuators are 24v dc. Mains electrical circuits are protected by overload cut outs and an integral residual current circuit breaker.

Construction

The educational unit is constructed from chemical resistant materials;

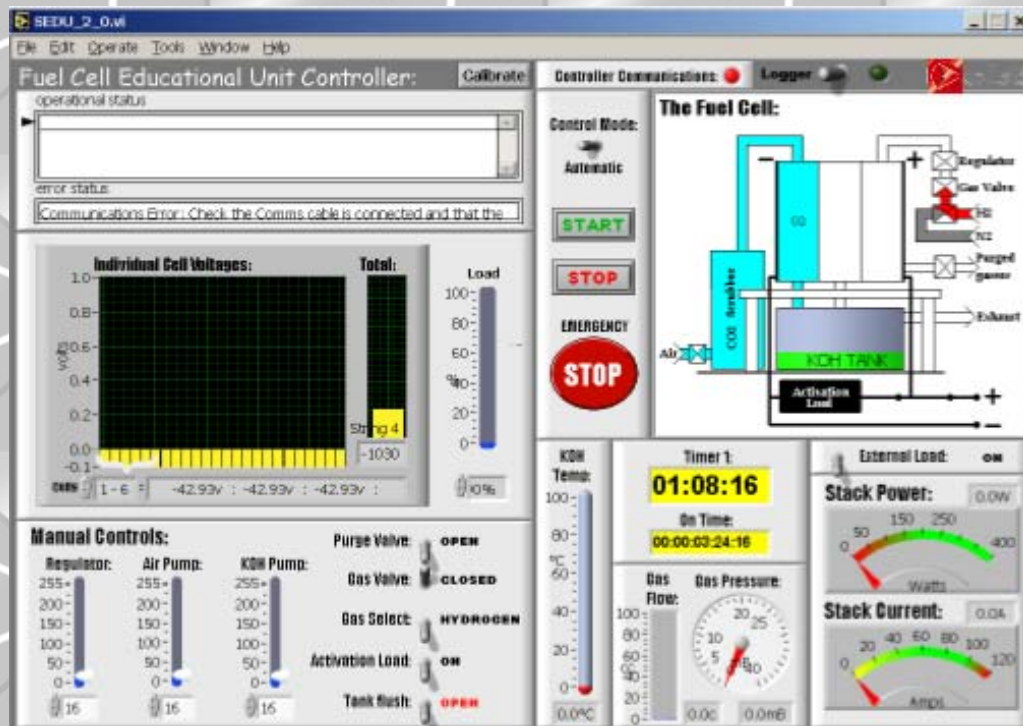
- Stainless steel
- Polypropylene
- Polycarbonate
- EPDM rubber
- PFA Plastic

Dimensions

Height: 920mm Depth: 430mm
Width: 1060mm Weight: 70kg



Sample Image From Software Supplied.



Accessories and Spares

Unit supplied with:

Control and data acquisition software. One experimental operating and maintenance manual. Accessories and spares for 2 years normal operation.

Services Required

Electrical:

A: 300W. 220/230v 1 phase 50/60Hz (With earth/ground)

Or

B: 300W. 110/120v 1 phase 50/60Hz (With earth/ground)

Consumables required as follows:

- 99.99% pure Hydrogen at 1 bar, Maximum 0.27m³/hour
- Oxygen free Nitrogen at 1 bar, Maximum 0.27m³/hour
- Distilled water (periodically, for electrolyte tank)
- Soda Lime. Carbon dioxide absorbent.

The unit is filled with an alkaline Potassium Hydroxide concentration 6.6mol/l (30% by weight).

Order as:

RE520 Educational Fuel Cell

Electrical Specification

Either: A: 400W. 220/230v 1 phase 50/60Hz (With earth/ground)

Or

B: 400W. 110/120v 1 phase 50/60Hz (With earth/ground)

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