

### Key Characteristics

System description	Stand alone 1 kW fuel cell module powered by ACAL Energy's Flowcath® technology
Packaging:	Capable of 19" Rack mounting
Appearance:	Self-contained unit, aluminium chassis with thermoplastic panels

### Operation

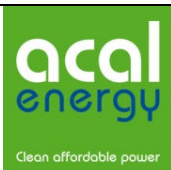
Start-up time:	ACAL will provide technical options and data to demonstrate strategies to minimise start-up time in production units depending on OEM requirements
Start-up power:	Option for customer to provide a suitable external DC power source 24Volts at a maximum of 20Amps.
Emergency stop:	Provided via manual push-button.
Water level:	Automated control, periodic user addition / drain.
Operating Environment	Temperature range: 5°C to 30° suitable for indoor use only
Overload protection	System will disconnect load in event of excessive demand and report error code
Error codes	ACAL will provide an agreed set of error codes that will be accessible to customer's engineers for fault analysis

### Inputs / Outputs

Stack Power:	1kW to user, load following.
Output Voltage:	12-36V DC Unregulated
Air input	100L/min maximum drawn from the ambient environment
Cooling:	Air-cooled via integrated fans.
Demister exhaust:	95% Relative humidity, 65°C, 90L/min max.
Noise:	< 65dBa (e.g. general laboratory equipment)
Fuel:	Bottled Hydrogen – spec TBD
Error codes:	ACAL will develop a set of agreed error codes which will be accessible to customer's engineers for fault analysis

### Control / Data-logging

Control system:	Bespoke microcontroller accessed via LabView interface
User Inputs:	System start/shut down, limited access to other functions via Labview to be agreed prior to installation. Potential to run agreed test protocols from the LabView interface including control of an external Load Unit via an agreed interface.



# Draft Specification Document

## Evaluation Unit

Logged:	Stack performance, Cell Voltage Monitoring, Redox state, Pressures and temperatures, Fan operation etc. Selected data will be made available to the user.
Communication:	Periodic upload of log file to website for retrieval by ACAL. Method of upload to be agreed

### Data to be provided with system

Performance	ACAL will provide measured performance characteristics under conditions agreed with to be agreed with customer (e.g. polarisation curves, start up response etc.)
Operating manual	Full operating manual including start-up, shutdown procedures, error codes and basic fault finding guide.

### Safety standards

The system will not be certified to international standards and is only suitable for laboratory use by qualified personnel

### Warranty

No explicit warranty will be provided.