Fuel Cell Module for Electricity Generation

The future of electricity generation will be using a Distributed Generation network, where electricity can be generated and consumed at the point of use. Distributed Generation networks can address the concerns of; increasing electricity demand, limitations of traditional power generation, efficiency losses through transmission & distribution lines and significant infrastructure investment.

There is a need today, and in the future, for secure and highly efficient generation of electricity with significantly lower greenhouse gas emissions.

CFCL’s Solid Oxide Fuel Cell (SOFC) technology will play a major part in this future providing low emission, highly efficient electricity from SOFC appliances.

Gennex™ is a 1kW fuel cell module, which is designed for integration inside future appliances. Gennex™ is ideally suited for micro-Combined Heat and Power (micro-CHP) appliances such as high efficiency condensing boilers, heat pumps and air circulation systems. Gennex™ can be used for other applications such as stand-alone generators.

Small, powerful base-load electricity generation

1 – Fuel cell stack
2 – Hot Balance of Plant
   (integrated, steam generator, burner, fuel & air heat exchanger)
3 – Air delivery system & air filter
4 – Water delivery system
5 – High temperature insulation
Gennex™ is a fuel cell module designed for commercial production. Using CFCL’s experience and expertise in fuel cells, stacks and complete fuel cell systems, appliance manufacturers can now integrate a SOFC electricity generator into future appliances. Gennex™ delivers high electrical efficiency and less heat – this enables operation throughout the year; 24 hours per day, 7 days per week.

To fully integrate the Gennex™ fuel cell module into future appliances, CFCL can provide a complete integration program incorporating a specialised engineering team.

### Features
- **Uses CFCL’s latest Pentra™ metal-ceramic fuel cell technology** – for higher power density
- **Internal steam reforming** – for increased electrical efficiency
- **Optimised hot Balance of Plant design** – for simple mounting and minimal heat loss
- **Full integration support from CFCL** – systems engineering experience

### Preliminary Specifications
**Gennex™ Fuel Cell Module**

#### Performance
- **Electrical output**: 1 kW
- **Thermal output**: ~250W – exhaust stream cooled to 60°C
- ~650W – exhaust stream cooled to 20°C
- **Electrical efficiency**: Greater than 50%
- **System efficiency**: 60 to 85% depending on exhaust temp.

#### Emissions
- **From fuel cell**: CO (<10ppm) & H₂O (vapour)
- Virtually no NOx or SOx emissions
- **Exhaust flow**: 90 to 130 standard litres per min
- **Exhaust Temp.**: 155 °C (Dew point 54°C)

#### Connections
- **Grid connection**: Parallel 220 - 240 VAC (Integrated by customer)
- **Natural gas**: Supply pressure 0.9kPa to 3.0kPa (Gas desulphurisation integrated by appliance manufacturer)
- **Water**: Supply Pressure 400kPa (Water treatment integrated by appliance manufacturer)

#### Operating Conditions
- **Size**: L x W x H 400 x 420 x 900 mm
  (excl ancillary equipment & high temperature insulation)
- **Ambient temp.**: +2 ºC to +40 ºC
- **Inlet Air temp.**: -20 ºC to +40 ºC
- **Location**: Indoors
- **Start-up time**: 13 hours
- **Mass**: 55kg + (excl ancillary equipment & high temperature insulation)

#### Integration
- **Waste heat recovery**: By appliance manufacturer
- **Gas desulphurisation**: By appliance manufacturer
- **Water treatment**: By appliance manufacturer
- **Flue**: By appliance manufacturer

Preliminary specifications only; data subject to alteration.

For more information about Gennex™, please contact your closest CFCL office.

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Founded in 1992, CFCL is a world leader in developing solid oxide fuel cells to provide sustainable distributed electricity generation. CFCL’s fuel cells have the potential to meet significant market demand in Europe and Asia for clean, efficient and reliable electricity derived from natural gas, LPG or renewable fuels.

With over 100 skilled staff and extensive patented technology, CFCL is pursuing partnerships to integrate its fuel cell products into domestic scale micro-generation appliances.

CFCL is a publicly listed company on both the London Stock Exchange - AIM market and the Australian Stock Exchange (code CFU).