

Backup Power Fuel Cell Systems for Secure Communications Networks

Introduction

Secure communications networks like TETRA require reliable backup power solutions which can operate for several hours or several days in an emergency when the electrical grid is no longer available.

With few moving parts and no degradation during standby periods, fuel cell technology provides an attractive solution compared to existing backup power systems.

The most compelling reason to use fuel cell technology for TETRA network applications is **improved overall reliability and security**. When events like blackouts, earthquakes, storms and hurricanes occur it is important that systems are operable and backup power will be delivered reliably for a long period of time regardless of the temperature or age of the backup power system.

IdaTech's fuel cell products are ideal for supporting secure communications networks. They provide clean, reliable, extended run backup power (up to multiple days) for applications ranging from 250 W to 15 kW.

IdaTech fuel cell systems incorporate several features that make it a highly suitable backup power solution for TETRA networks:

- **LONG RUN TIMES** – Up to several days of autonomy (continuous run)
- **RELIABLE** – Few moving parts and no discharge in standby mode
- **QUIET** – Low noise signature
- **ROBUST** – Operating range from -40°C to +50°C
- **FLEXIBLE** – Indoor (container/shelter) or outdoor installations
- **POWERFUL** – Up to 15 kW

- **LOW MAINTENANCE** – Minimal annual maintenance
- **COST EFFECTIVE** – Attractive total cost of ownership
- **CLEAN ENERGY** – Low emissions and low environmental impact

How does it work?

The system continuously senses the direct current (dc) bus voltage and seamlessly takes over critical loads if the dc bus falls below a customer determined set point. The system is fueled by hydrogen which is delivered to the fuel cell stack in one of two ways; either from a commercial grade hydrogen supply or from a liquid fuel (methanol/water) using an integrated reformer system. Electricity is generated by the fuel cell stack as direct current. The dc energy is passed to a dc/dc converter which converts the unregulated dc electricity from the fuel cell stack into high quality regulated dc electricity to serve the required loads. IdaTech fuel cell systems can provide multiple days of backup power since run time is limited only by the amount of hydrogen fuel or methanol/water fuel stored on site.



Backup Power Fuel Cell Systems for Secure Communications Networks

Benefits of Fuel Cells vs. Current Backup Power Solutions

Fuel cells offer improved system reliability, more predictable performance in a broad range of climates and a reliable service life when compared to the industry standard valve regulated lead acid (VRLA) battery strings. Life cycle costs are also reduced because of greatly decreased maintenance and replacements needs. Fuel cells offer environmental advantages to end users because disposal costs and liability risks related to lead acid batteries are an increasing concern.

Battery performance can be affected by a wide variety of factors including charge level, temperature, cycles, age, and other variables. The energy provided will vary based on these factors and is not easily predicted. PEM fuel cell performance is relatively unaffected by these factors and will provide critical power as long as there is fuel available. Increased predictability is cited as an important advantage in switching to fuel cells for critical backup power applications.

Fuel cells only generate energy when fuel is applied, like a combustion generator, but have no moving parts in the generating region. Therefore, unlike a generator, they are not prone to rapid wear or frequent maintenance and lubrication requirements.

Extended Run Solutions

IdaTech has developed the capability to generate hydrogen onsite using liquid methanol/water fuel and our patented reformer technology. This allows the fuel cell to support backup power requirements of days versus hours by using a compact and convenient liquid fuel.

Bottled hydrogen is appropriate and cost effective for many backup power applications, but when critical backup power systems need to operate for more than 8 hours, a compact liquid fuel system is a more practical solution.

48 hours of operation at 5kW requires one of the following:



Backup Power Fuel Cell Systems for Secure Communications Networks

Methanol Fuel

The fuel used to operate the extended run fuel reformer is a fuel mixture of methanol and water. Methanol is a readily available, commercially produced fuel that is currently used in common applications such as windshield washer fluid, engine additives, molded seat cushions, latex paints, clear plastic bottles and silicon sealants, among others. Methanol is easily transported, water miscible, biodegrades quickly and is sulphur-free. Methanol is less flammable than gasoline and burns with a cool, low particulate flame. It has a low freezing point (-50°C) and does not degrade when stored for a long time.

Conclusions

For secure communications networks, fuel cell backup power systems offer numerous advantages compared to traditional stand-alone battery or diesel generators. Liquid fuel technology solves hydrogen siting challenges and provides virtually unlimited backup power operation. The IdaTech iGen™ and ElectraGen™ family of field-proven fuel cell systems are commercially available today for mission critical and remote sites.

For more information please visit www.idatech.com.

IdaTech Backup Power Product Line



iGen™

- Power range:** 250 W
- Voltage:** 24 Vdc or 12 Vdc
- Dimensions:** 338 x 437 x 445 mm (WxDxH)
- Temperature:** -20°C to +50°C
- Fuel type:** Methanol/water liquid fuel



ElectraGen™

- Power range:** 5 kW or 3 kW
- Voltage:** 48 Vdc or 24 Vdc
- Dimensions:** 0.6 x 1.0 x 1.3 m (WxDxH)
- Temperature:** -40°C to +50°C
- Fuel type:** Hydrogen gas



ElectraGen™ XTi

- Power range:** 5 kW or 3 kW
- Voltage:** 48 Vdc or 24 Vdc
- Dimensions:** 1.5 x 0.9 x 2.1 m (WxDxH)
- Temperature:** -40°C to +50°C
- Fuel type:** Methanol/water liquid fuel