

Application Note

Fuel Cell Backup Protects Critical Security Systems

Introduction

The most sophisticated building security and communications system is only as reliable as the power supply that keeps it up and running. While most systems integrate some type of UPS backup for short-term power loss, they make no provision for extended grid outages that can occur after a natural disaster or terrorist attack. This can be a critical issue for many corporate and government facilities.

Vital site operations such as closed-circuit TV monitoring and access control (badge readers, door locking devices, biometrics, etc.), fire alarms and suppression systems, elevator controls and telecommunications networks are all at risk without a reliable long-term alternate power source.

Diesel generators are noisy and difficult to site, with well-known reliability and maintenance issues. By contrast, a backup power fuel cell system from IdaTech is quiet, reliable, emits zero to low emissions, and is easily installed on rooftops or outside buildings. It does not discharge or degrade in standby mode. It ensures continued 24/7 operation of critical systems, even after the facility has been shut down and the premises vacated.

IdaTech fuel cells protect costly investment of critical applications. They provide clean, reliable, extended run backup power (up to multiple days) for applications up to 15 kW, plus many outstanding features:

- **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
- **ENVIRONMENTALLY FRIENDLY** – Low emissions with minimal environmental impact



How the Fuel Cell Works

The system will automatically detect the power failures and will seamlessly take over the critical load. 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 HydroPlus, a methanol and water liquid fuel 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 or ac (using inverter/UPS) 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.

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.

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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 generate energy only 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 on site using HydroPlus (methanol/water) 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, or hydrogen storage is not practical or in remote locations where hydrogen delivery is not feasible, a compact liquid fuel system is a more practical solution.

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 silicone sealants, among others. Methanol is easily transported, water miscible, easily biodegradable and sulphur-free. It has a low freezing point (-71°C) and does not degrade when stored for a long time.

Conclusions

For critical applications like building security and management, 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 ElectraGen™ family of field-proven fuel cell systems are commercially available today for mission-critical sites.

For more information please visit www.idatech.com.