

Hydrogen Fuel Cells - Government Applications



Reli On
+ -[®]

Government and military communications networks encompass a wide variety of technologies designed for the optimum ability to keep people safe and complete the mission at hand. Whether the application is E-911 services, video surveillance, radio and repeater sites, flight guidance systems or continuity of operations, each of these technologies share the need for power. In a mission critical situation, loss of power is unacceptable. ReliOn fuel cell solutions are proven to electrically harden critical networks against service-impacting issues.

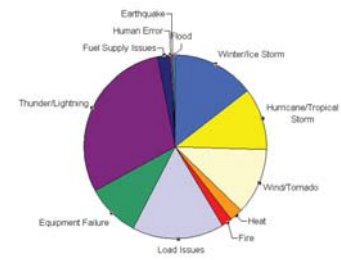
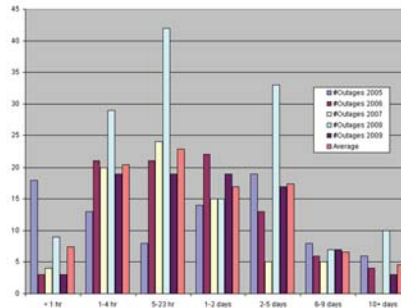
Fuel Cells

Simply Powerful

your sites

Federal and State Government agencies face many challenges to completing their critical missions involving communications, security and response. Keeping power flowing should be the least concern, but without the power needed to keep it running, critical equipment goes off-line and is no longer useful to the operation. Extreme weather, human error and sabotage all pose threats to stable grid power service. According to an average of the 2005 through 2009 data provided by the DOE's Energy Information Administration, these major disturbances caused more than 192 cumulative days of lost grid power per year in the U.S. alone, with durations lasting between minutes and weeks, affecting more than 9 million customers. This does not include the day-to-day disturbances we all experience from time to time. Most of these outages center between one hour and two days in length.

2005-2009 U.S. Grid Outage Data



Source: Energy Information Administration

When your mission is to get data through no matter what, backup power becomes imperative. Finding a solution that works in all cases is impossible. Even when you have a backup power solution that works fairly well, there can be roadblocks. Assigning key personnel to handle the replacement and repair of batteries and generators takes focus away from the objectives at hand. Resiliency and redundancy are required to supply consistent power, ensuring an absolute minimum of downtime and providing for stable services by improving reliability and availability. Fuel scarcity in times of disaster can threaten fuel supply for backup generators, and in some regions, the generators themselves are at risk of theft or sabotage.

At ReliOn, we understand the difficulties – with over 100 years experience with communications networks on our management team, many of us have been where you are. We provide backup power solutions for communications in several branches of the Federal Government as well as State Agencies – through hurricanes, snowstorms and extreme cold. In applications needing as little as 50 Watts as well as those needing several kilowatts – for sites needing hours of backup power and those needing days.

	C4ISR	Radio/Repeater Sites	Flight Guidance ILS	Disaster Response	Video Surveillance	Microwave Communications
< 1kW		●	●	●	●	●
2kW	●	●		●	●	
4kW	●	●		●		
6kW+	●			●		

reliable, cost-effective backup solution with a seamless upgrade path, maximizing initial investments in fuel cell backup systems, and dramatically reducing the impact on operating budgets.

Electrical Hardening for Mission Critical Applications

Government personnel install power systems both indoors and outdoors, depending on the characteristics of the installation site. ReliOn's fuel cell systems can be installed in a wide variety of configurations, both indoors in standard racks, and in our own outdoor enclosures. Product scalability allows ReliOn systems to meet your actual power requirements, whether smaller or larger capability is needed. As your power needs change, ReliOn's system can adapt quickly, protecting your investment going forward.

Tactical Advantages

In critical equipment installations, excess heat and noise become a detriment to mission security. ReliOn's fuel cell solutions are tactically advantageous due to their low heat signatures and quiet operations. And easy deployment and low maintenance requirements mean fewer trips to equipment sites.

Fuel Supply

ReliOn's fuel cell solution uses industrial-grade hydrogen, available through multiple industrial gas suppliers, and with little competition for supply during widespread outages. With each fuel cabinet providing 48kWh of hydrogen storage, supplying fuel for hours or days becomes a simple issue.

our solutions

ReliOn fuel cell systems have revolutionized the application of reliable backup power for critical equipment. ReliOn's E-series and T-series products provide several advantages over traditional backup power methodologies - batteries and internal combustion generators - as the sole power solutions. Like batteries, fuel cells provide current directly to the DC bus, but have a significantly increased service life and decreased maintenance costs, as well as a smaller footprint for longer runtimes. Installation is accomplished with ease. Additionally, fuel cell runtime, as with a generator, is a function of fuel storage, but with few moving parts and lower maintenance.

Reliable

- Modular, fault-tolerant design enables advanced management of fuel cell membranes, which leads to increased reliability of the system.
- N+1 or 1+1 redundancy is designed into the system.

Modular

- Patented modular cartridge design means ReliOn is the only company providing easy hot-swappable* maintenance in seconds, without tools, and while continuing to provide power to the customer load.
- ReliOn's E-series offers a modular, fault-tolerant design, ensuring continued power to customer equipment, using larger power module building blocks. Multiple bus and multiple voltage scenarios are easy to accommodate.

Scalable

ReliOn products allow the customer to configure the product to suit the load.

- From under 100 Watts to 20,000 Watts.
- Scalable hydrogen storage provides for up to hundreds of hours of runtime easily.

Low Maintenance

- Annual air filter inspection.
- Refueling as needed - hours to weeks of runtime between refueling cycles.
- Mean time to repair - minutes.
- Advanced diagnostics and self-testing

Environmentally friendly

- Hydrogen in, power and warm water out.
- No emissions
- Low noise signatures under 60 dBA @ 5 feet.

U.S. Tax Credit Availability

- Federal tax credits available for systems above 500W.
- \$3,000 per kilowatt or 30% of system cost, whichever is less.
- Additional incentives available in some States make value proposition very attractive.

Environmentally-hardened

- Temperature range from -40°C to 50°C / -40°F to 122°F.
- Field-proven ability to perform during hurricanes, ice storms and other harsh weather.
- Diverse geographic locations.

Monitoring and Control

- Remote / local system configuration and status monitoring for historical and operational data.

Hybrid configurations

- Whether off-grid or on, ReliOn fuel cells work well in hybrid solutions with solar and wind power for a complete clean energy solution.

Available on the GSA

- Contract #GS-07F-0496N

* ReliOn's T-1000 and T-2000 fuel cell systems offer hot-swappable maintenance.

	ReliOn	Batteries	Generators
Modular	●	●	●
Scalable	●	●	●
Hot-swappable*	●	●	●
Reliable	●	●	●
Simple Design	●	●	●
Environmentally Friendly	●	●	●
Environmentally-hardened	●	●	●
Low Maintenance	●	●	●
Ease of Permitting	●	●	●
Extended Runtime Solutions	●	●	●
Monitoring & Control	●	●	●
U.S. Tax Credits	●	●	●

specifications



T-1000® Rack Mount

Physical

Dimensions (w x d x h)
14" x 21.5" x 26" [in rack]
35.6cm x 54.6cm x 66cm

Weight
96 to 162 lbs / 44 to 74 kg*

Mounting
19" or 23" rack mount

Rated net power
0 to 1,200 Watts

Performance

Rated current
0 to 50A @ 24 VDC / 0 to 25A @ 48VDC

DC voltage
24 or 48 VDC nominal

Composition
Standard industrial grade hydrogen (99.95%)

Supply pressure to unit
3.5 to 6 psig / 24 to 41 KPag
0.24 bar to 0.41 bar

Fuel

Hydrogen Storage Capacity
Modular solutions scalable
from 2.5 kWh to 300 kWh

Operation

Ambient temperature
32°F to 115°F / 0°C to 46°C

Relative humidity
0-95% non-condensing

Altitude
-197 ft to 13,800 ft / -60m to 4,206m

Location
Indoors



T-2000® Rack Mount

Dimensions (w x d x h)
21" x 21.5" x 26"
53.3cm x 54.6cm x 66cm

Weight
134 to 244 lbs / 61 to 110 kg

Mounting
23" rack mount

Rated net power
0 to 2,000 Watts

Rated current
0 to 80A @ 24VDC / 0 to 40A @ 48VDC

DC voltage
24 or 48 VDC nominal

Composition
Standard industrial grade hydrogen (99.95%)

Supply pressure to unit
3.5 to 6 psig / 24 to 41 KPag
0.24 bar to 0.41 bar

Hydrogen Storage Capacity
Modular solutions scalable
from 2.5 kWh to 300 kWh

Ambient temperature
35°F to 115°F / 2°C to 46°C

Relative humidity
0-95% non-condensing

Altitude
-197 ft to 13,800 ft / -60m to 4,206m

Location
Indoors



E-200™ Rack Mount

Dimensions (w x d x h)
17.25" x 18.5" x 3.38"
43.8cm x 47cm x 8.6cm

Weight
30 lbs / 13.6 kg

Mounting
19" or 23" rack mount

Rated net power
0 to 175 Watts @ 12/24 VDC / 0 to 150 Watts @ 48 VDC

Rated current
0 to 15A @ 12VDC / 0 to 7.5A @ 24VDC / 0 to 3.75A @ 48VDC

DC voltage
12, 24 or 48 VDC nominal

Composition
Standard industrial grade hydrogen (99.95%)

Supply pressure to unit
3.5 to 6 psig / 24 to 41 KPag
0.24 bar to 0.41 bar

Hydrogen Storage Capacity
Modular solutions scalable
from 2.5 kWh to 300 kWh

Ambient temperature
35°F to 115°F / 2°C to 46°C

Relative humidity
0-95% non-condensing

Altitude
-197 ft to 13,800 ft / -60m to 4,206m

Location
Indoors



E-1100™ Rack Mount

Physical

Dimensions (w x d x h)
17.25" x 24" x 7"
43.8cm x 61cm x 18cm

Weight
58 lbs / 26.4 kg*

Mounting
19" or 23" rack mount

Rated net power
0 to 1,100 Watts

Performance

Rated current
0 to 46A @ 24 VDC / 0 to 23A @ 48VDC

DC voltage
24 or 48 VDC nominal

Fuel

Composition
Standard industrial grade hydrogen (99.95%)

Supply pressure to unit
10 psig / 69 KPag / 0.69 bar operating

Hydrogen Storage Capacity

Modular solutions scalable
from 2.5 kWh to 300 kWh

Operation

Ambient temperature
35°F to 122°F / 2°C to 50°C

Relative humidity
0-95% non-condensing

Altitude
-197 ft to 13,800 ft / -60m to 4,206m

Location
Indoors



E-1100™ Extended Run

Dimensions (w x d x h)
50" x 35" x 72"
127cm x 89cm x 183cm

Weight
470 lbs / 212 kg*

Rated net power
0 to 1,100 Watts per chassis

Rated current
0 to 46A @ 24 VDC / 0 to 23A @ 48VDC

DC voltage
24 or 48 VDC nominal

Composition
Standard industrial grade hydrogen (99.95%)

Supply pressure to unit
10 psig / 69 KPag / 0.69 bar operating

Hydrogen Storage Capacity
Modular solutions scalable
from 2.5 kWh to 300 kWh

Ambient temperature
-40°F to 122°F / -40°C to 50°C

Relative humidity
0-95% non-condensing

Altitude
-197 ft to 13,800 ft / -60m to 4,206m

Location
Outdoors



E-2500™ Rack Mount

Dimensions (w x d x h)
21.25" x 24" x 14" [in rack]
54.7cm x 61cm x 35.6cm

Weight
81 lbs / 37 kg*

Mounting
23" rack mount (8U)

Rated net power
0 to 2,500 Watts

Rated current
0 to 104A @ 24 VDC / 0 to 52A @ 48VDC

DC voltage
24 or 48 VDC nominal

Composition
Standard industrial grade hydrogen (99.95%)

Supply pressure to unit
10 psig / 69 KPag / 0.69 bar operating

Hydrogen Storage Capacity
Modular solutions scalable
from 2.5 kWh to 300 kWh

Ambient temperature
35°F to 122°F / 2°C to 50°C

Relative humidity
0-95% non-condensing

Altitude
-197 ft to 13,800 ft / -60m to 4,206m

Location
Indoors

ReliOn

FUEL CELLS
SIMPLY POWERFUL

* weight references fully equipped solutions, without hydrogen cylinders

Corporate Headquarters:

15913 E. Euclid Ave. Spokane, WA 99216

Phone: 509-228-6500 Toll Free: (U.S.) 1-877-474-1993 Fax: 509-228-6510 fuel.cells@reli-on-inc.com www.reli-on-inc.com