

■ Outside Plant for
Business-Critical Continuity™

NetXtend™ Fuel Cell Series *Integrated Enclosure Solutions*





Key Features

- Flexible enclosure configurations include a stand alone backup DC power system or integrated NetSure™ DC power hub and NetXtend™ PTS power transfer switch
- Turnkey, incremental fuel cell backup in 2 kW building blocks
- Meets or exceeds the FCC 07-107 backup power mandate for remote sites
- Eliminates emissions, engine noise and service problems associated with diesel generators
- Interfaces with both -48VDC or +24VDC telecom systems
- Enclosures designed to meet Telcordia GR-487-CORE, UL and National Electric Code (NEC) safety requirements
- Seismic Zone 4 compliance available
- Modular, cartridge-based fuel cell design with proton exchange membrane
- System suitable for indoor or outdoor installation
- Adjacent or remote hydrogen storage placement for site flexibility

Meeting the FCC Backup Power Mandate

Description

In the aftermath of hurricane Katrina, the Federal Communications Commission (FCC) ordered increased backup power for remote installations to enhance the reliability of the telecom network. To help carriers meet these requirements, Emerson Network Power has formed strategic partnerships with leading fuel cell manufacturers to offer a series of back-up power solutions that incorporate fuel cell technology as an alternative energy source.

The constraints of today's power grid, rapidly rising battery prices and government incentives to adopt alternative energy sources now make it feasible to replace backup batteries with fuel cells. Emerson serves as an integrator, application expert, installer and field service provider of DC power systems that utilize fuel cell technology. We offer compact, clean, total-cost-effective emergency backup power solutions for your network infrastructure.

The NetXtend™ Fuel Cell Series of integrated enclosures is a turnkey DC power solution that incorporates modular 2 kW

fuel cell building blocks to replace the primary backup battery plant or on-site generator. The enclosure houses a DC power "bridge" solution that consists of bridging capacitors or a small battery plant, a fuel storage enclosure, an optional NetSure™ DC Power system, as well as an optional NetXtend™ PTS.

The basic solution is contained in two enclosures. A factory-wired, environmentally conditioned NetXtend™ Power Series cabinet incorporates the fuel cell system and optional DC power system, power transfer switch, and equipment rack. A secondary cabinet houses the hydrogen supply. Basic cabinet configurations may be expanded to increase power capacity in 2 kW expansion blocks and provide additional hydrogen storage for customer premise and ancillary equipment backup power.

Emerson's nationwide service group will engineer, furnish, install and service your NetXtend™ Fuel Cell enclosures. We are the experts in DC power systems, outside plant (OSP) enclosures, and power transfer equipment!

Integrated power solutions with fuel cell technology to satisfy your extended DC power back up requirements as well as the FCC Emergency Backup Power Mandate.



NetXtend™ Fuel Cell Series (doors open)



NetXtend™ Fuel Cell Series (doors closed)

- 1 Cooling System
- 2 ReliOn® Fuel Cell
- 3 NetSure™ 501 DC Power System

- 4 Bridge Battery System
- 5 Hydrogen Fuel Tanks
- 6 NetXtend™ Juicebox® PTS Enclosure

- 7 Cooling System
- 8 NetXtend™ Power Series Enclosure
- 9 Hydrogen Storage Cabinet



NetXtend™ Fuel Cell Series



NetSure™ 501 DC Power System



NetXtend™ JuiceBox® PTS Series

Enclosures

NetXtend™ Fuel Cell Series enclosures are housed in a rugged, compact, cabinet designed to meet Telecordia GR-487-CORE and UL Listed safety regulations.

All cabinets provide the same base configuration, with minimum footprint suitable for concrete or resin pad installation. Each enclosure is factory-wired and configurable to accommodate customer site or premise equipment, in addition to the DC power equipment and the fuel cell backup system. Cooling options are custom designed to meet your requirements and can be factory or field installed to provide maximum cooling and lower utility costs. An environmentally sealed cable-access system can be configured to interface with your specific site requirements, if desired.

NetSure™ DC Power Systems

NetXtend™ Fuel Cell Series integrated enclosure solutions are optimized for use with NetSure™ 501 or 701 DC power systems. This modular DC power platform with front accessible, hot-swappable rectifiers, is easy to install, operate, service and upgrade. With single-point adjustment, no tools are required to change settings. Plenty of space is available in the enclosure for the fuel cell system and additional revenue-generating ancillary equipment due to the high density nature of these NetSure™ systems. The power shelf can be configured for a wide range of applications with 19" or 23" rack mounting. Remote access to NetSure™ system is accomplished with smart controllers and supervision modules, providing status and alarm notifications via Ethernet, modem or other interface.

Power Transfer Switch

The NetXtend™ JuiceBox® PTS Series can be integrated with the fuel cell system for primary AC surge protection. The AC load center offers 100 or 200 amp main service. Numerous configurations are available, utilizing switching, distribution and circuit protection components from world-class manufacturers. The PTS mounts to either side of the cabinet, features all aluminum or galvanized construction, stainless steel hardware, and a multistage powder coating for low maintenance and longer life. Meets UL3R rainproof requirements.



Remote Site Services

Installation & Support Services

Whether you need to upgrade backup power at one site or several, you will benefit from Emerson's program management and wide array of nationwide installation and support services. Our experienced technicians will conduct site surveys of your current power equipment, recommend and engineer the necessary solution to accomplish your goals, prepare prints and other documentation, and pre-stage and configure all equipment to minimize installation time. We will install and test all cabinets and power equipment and provide post-installation maintenance contracts and emergency services to keep all systems running efficiently.

Application

The NetXtend™ Fuel Cell Series provides utility power rectification and extended backup power for cell sites, remote switch sites, digital loop carrier system remote terminals, microwave backhaul radio sites, base transceiver stations, DSLAM, and FTTx sites normally powered by local AC power. These integrated systems may be located in a variety of outside plant solutions adjacent to existing cabinet sites or within huts, large vaults or other structures.





Fuel Cell & Storage

The ReliOn® T-Series fuel cell incorporates hot-swappable, modular cartridges with Proton Exchange Membrane (PEM) technology. If one cartridge fails, the remaining cartridge systems will carry the full system load. Both -48VDC and 24 VDC voltage ranges are available from every shelf. System loads range from 1kW to 10kW and above.

The fuel cell connects directly to the DC bus of the DC power system or site electronics (Fig. A). Fuel cells are air-cooled with an integral heater and cooling fan, in addition to the enclosure's cooling

system. Each system is environmentally hardened to operate between -40°C to +46°C ambient. Under normal DC backup operation, cartridges last well beyond 10 years before requiring replacement (compared to 3-5 years lifespan of the battery string).

Hydrogen fuel is stored in a separate enclosure capable of mounting low-pressure, refillable cylinders. Optional high-pressure tanks are refilled at the site from bulk tank trucks. The rate of fuel consumption is determined by the load. Run time is easy to quantify with the chart

on the following page (Fig. B). The fuel cell system produces straight-line output as long as fuel is available and each system is remotely monitored for voltage, power output, and hydrogen fuel levels.

No other DC backup system on the market today contains the configurability and ease of operation as the NetXtend™ Fuel Cell Series from Emerson.

ReliOn® T-Series Fuel Cell



Hot Swappable Cartridge

Emerson Network Power —
 experts in DC power systems, outside plant enclosures,
 and power transfer equipment to help you meet the FCC
 emergency backup power mandate

Fig. A: PEM fuel cell shown in a battery replacement scenario

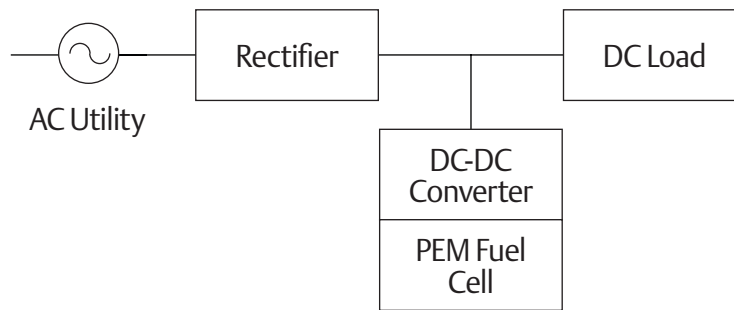
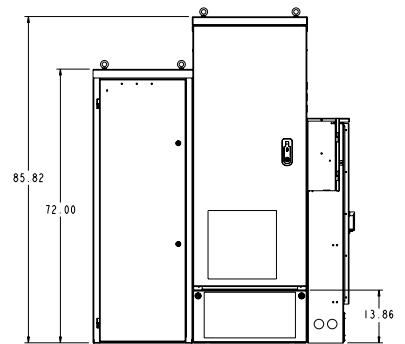
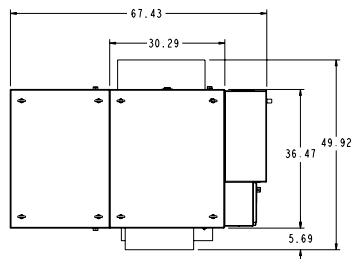
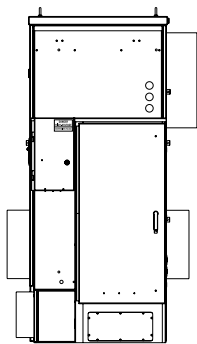


Fig. B: Rate of hydrogen fuel consumption

Kilowatts	Voltage	Load	Hydrogen	Backup
2.0kW	-48Vdc	40 Amps	6 Bottles	24 Hours
2.0kW	+24Vdc	80 Amps	6 Bottles	24 Hours
4.0kW	-48Vdc	80 Amps	6 Bottles	12 Hours
4.0kW	+24Vdc	120 Amps	6 Bottles	12 Hours
8.0kW	-48Vdc	120 Amps	12 Bottles*	12 Hours
8.0kW	+24Vdc	240 Amps	12 Bottles*	12 Hours

*8.0kW solution denotes dual fuel cell cabinet and dual hydrogen storage cabinet.

Specifications



Dimensions (H x W x D)

	2-4 kW	6-8 kW	10-12 kW
Complete Fuel Cell Solution	72.0" x 60.0" x 36.5"	72.0" x 90.0" x 36.5"	72.0" x 120.0" x 36.5"
Hydrogen Storage Cabinet	72.0" x 31.0" x 36.5"		
Power Series Cabinet	72.0" x 31.0" x 36.5"		
Optional Bridge Battery System Base	Add 13.9" to the height of any of these Power Series cabinets		
Optional Power Transfer Switch (PTS)	59.0" x 22.0" x 9.1"		

Specifications

Performance

Rated Net Power	0 – 2,000 watt increments
Rated Current	0-80 amp increments @ 24 VDC/ 0-40 amps @ 48 VDC
DC Voltage	24 or 48 VDC nominal

Fuel

Composition	Standard industrial grade Hydrogen (99.95%)
Supply Pressure to system	3.5 to 6 psig/ 24 to 41 KPag
Consumption	30 slpm @2000 watts
Hydrogen Storage	Modular solutions scalable from 48 to 96 kWh



Specifications (cont.)

Operation

Ambient Temperature	-40°F to 115°F/ -40°C to 46°C
Relative Humidity	0-95% non-condensing
Altitude	-197 ft to 13,800 ft/-60m to 4,206m
Location	Indoor and outdoor applications

Emissions

Water	Maximum 30mL/kWh
Noise	Less than 65dBA @3.28/1 meter

Monitoring and Control

Remote Communications	System configuration and status/historical and operational data SNMP
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Enclosure Mounting

Enclosure	Pad-mounted, roof-mounted, grate-mounted
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Equipment Mounting

Total mounting space	35RU
Rack widths	23-inch EIA standard
Center mounting	Accepts standard 12-inch deep, center mount equipment (5-inch front, 7-inch rear)

Environmental Protection

Finish	Off-white, polyester powder coat
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Thermal System

Fuel Cell System	High efficiency, air cooled system
Optional Battery Base	Air cooled or DC powered cooler
Hydrogen Storage Cabinet	Free vented

Electrical

AC System	8-position TO 24-position power distribution panel with integrated surge protection (optional)
Battery heater pad kit (optional)	Available upon request
Compatible batteries & amp-hour reserve (Bridge Power reserve)	Quantity (1) string of 4- 12VDC 155 amp-hour front post batteries (48VDC string) i.e. FIAMM®, GNB, C & D

Security

Padlockable Intrusion alarm	Tamper resistant quarter turn hardware (T-handle wrench) Intrusion alarm with local indication and remote location options
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Bonding and Grounding

	10-position, dual holed L49, copper buss, 3/16-in. thick, 1/4-20 hardware located in splice chamber
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Cable Entrance Per Specific Site Requirements

	Two, 2.5-in. cable entrance cones (cable dressing bracket provided with protection panel kit)
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Safety Compliance

Meets these industry standards	Meets UL, CSA and Telcordia industry standards
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Ordering Information

Ordering Matrix: NXF a b c d e f

Cross-Connect Cabinet	NXFCS = NetXtend™ Fuel Cell Series
a) Kilowatt Range	02K = 2.0 kW fuel cell system 04K = 4.0 kW fuel cell system 06K = 6.0 kW fuel cell system 08K = 8.0 kW fuel cell system 10K = 10.0 kW fuel cell system
b) Fuel Reserve Time*	08H = 8 hours of backup time 12H = 12 hours of backup time 18H = 18 hours of backup time 24H = 24 hours of backup time
c) Voltage Output	24V = +24 volt applications 48V = -48 volt applications
d) Bridge Battery Requirement*	1H24 = One hour @ 24VDC 1H48 = One hour @ -48VDC 2H24 = Two hours @ 24VDC 2H48 = Two hours @ -48VDC 0000 = No Bridge Battery System
e) Optional Power Transfer Switch	0 = No 1 = Yes
f) Optional Integrated DC Power Systems	0 = No 5 = NetSure™ 501 7 = NetSure™ 701

*Additional back up times available

Example: Catalog number NXF08K08H48V1H4815 represents an 8.0 kW fuel cell system with 8 hours of backup storage, -48 volt DC output, a bridge battery with 1 hour backup at -48VDC, a PTS and a NetSure™ 501 DC power system.

The NetXtend™ Fuel Cell Series is capable of providing backup power to the most critical DC power sites. This integrated solution grows with your backup power needs and infrastructure budget.

Ordering Information

Catalog No.	Part No.	Description
NXF04K12H48V000000	F2008206	4.0 kW fuel cell system and storage cabinet
NXF08K08H48V000000	F2008207	8.0 kW fuel cell system and storage cabinet
NXF04K12H48V1H4815	F2008208	4.0 kW fuel cell system, 12 hour backup storage cabinet, -48VDC output, one hour Bridge Battery System, PTS, NetSure 501 DC power system
NXF08K08H48V1H4815	F2008209	8.0 kW fuel cell system, 8 hour backup storage cabinet, -48VDC output, one hour Bridge Battery System, PTS, NetSure 501 DC power system

NOTE: Other configurations are available. See individual product brochures or call customer service for more information.

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| ■ AC Power | ■ Embedded Power | ■ Precision Cooling |
| ■ Connectivity | ■ Monitoring | ■ Racks & Integrated Cabinets |
| ■ DC Power | ■ Outside Plant | ■ Services |
| ■ Embedded Computing | ■ Power Switching & Controls | ■ Surge Protection |

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