Stationary Fuel Cell Product Catalog

Plug Power ReliOn Product Catalog Rev 5
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Today's Fuel Cells for proven, reliable power.

Contents

Certifications
ReliOn products are tested or certified to stringent standards from CSA, UL, CE, Telcordia NEBS and China TTL Labs.

The ReliOn Difference

Our philosophy is that new technology should be innovative and ultimately more reliable than traditional technologies – otherwise, why change?

Plug Power's forward-thinking design philosophy results in fuel cell power solutions that give You, the customer, a highly reliable, cost-effective and clean energy solution with a seamless upgrade path, maximizing initial investments in fuel cell systems, and dramatically reducing the impact on operating budgets and the environment.

Through proven field performance and third party testing, Plug Power's ReliOn fuel cell systems have demonstrated many of the benefits associated with traditional technologies while minimizing the limitations associated with battery systems and combustion generators. This is the ReliOn difference.

Robust High Reliability
ReliOn fuel cells have a reliability rating of 99.6%, arrived at through multiple third party testing in commercial customer environments over the course of several years. Simplicity of design and very few moving parts result in a robust, reliable power solution.

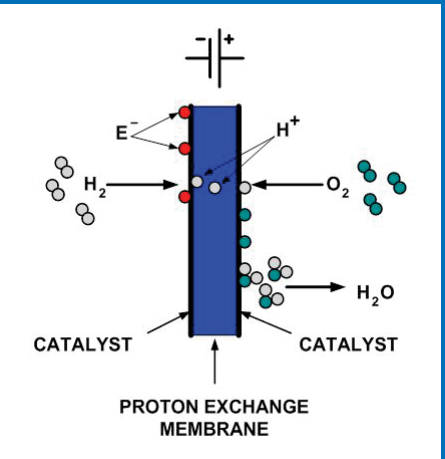
Batteries offer a moderate level of reliability to customer equipment locations needing a low level of power. Use is limited by the need to increase the size of the footprint linearly in order to add runtime. Temperature sensitivity can shorten battery life and reduce capacity, so care must be taken to ensure proper maintenance.

Diesel generators of the size routinely used at telecommunication outside plant sites have a reliability rating of 88.4% according to third party reports. With hundreds of moving and sliding parts, generators have many points of potential failure.

Cost Effective
A critical element in capital procurements is the cost of ownership of equipment. Plug Power's ReliOn fuel cell solution is a cost effective solution when compared to traditional technologies, both in terms of capital and ongoing costs.

How does a ReliOn fuel cell work?

A hydrogen fuel cell generates electricity through an electro-chemical reaction using hydrogen and oxygen. In simplified terms, it works like this: Hydrogen is sent to one side of a proton exchange membrane. The hydrogen proton travels through the membrane, while the electron enters an electrical circuit, creating a DC electrical current. On the other side of the membrane, the proton and electron are recombined and mixed with oxygen from room air, forming pure water. Because there is no combustion in the process, there are no other emissions, making fuel cells an extremely clean and renewable source of electricity.



A fuel cell maintenance call generally happens once a year and involves inspection of and possible exchange of a standard air filter. This low maintenance is attributable to the simplicity of fuel cell design. Simple maintenance and fewer site visits mean up to 84% lower operational costs when compared to combustion generators.

Sustainability - Clean Technology

As a clean technology, fuel cells have minimal impact on the environment. ReliOn fuel cell “emissions” are DC electricity, warm air and a small amount of water. ReliOn fuel cell products utilize environmentally benign hydrogen as a fuel source, which eliminates the environmental impact of fuel spillage, leaks or air pollution and results in simplified zoning requirements. Because of this, they are exempted from the very stringent California Air Resources Board (CARB) and a number of other states’ emission permitting requirements. Additionally, the ReliOn fuel cell system has noise levels of a typical telecom cabinet, allowing it to be placed in applications where the noise level of a generator is not acceptable.

A Modular Product Line: Scalability

The advantages of using a modular, fault-tolerant product are simple. Greater reliability. Easier to service. But the most important benefit may be scalability – and the savings that feature provides when purchasing and using a fuel cell.

With its patented technology, Plug Power creates solutions that are engineered precisely to meet a variety of customer power needs. Instead of buying a 5,000 Watt product to meet a 3,300 Watt requirement, our customers can buy a 3,300 Watt unit. Paying for only what you need just makes good business sense. As your power requirements increase, our modular design allows for the addition of further rack-mounted products to meet the new requirement without having to replace the existing system.

Environmentally-hardened

ReliOn E-series fuel cells may be rack-mounted or housed in a rugged, compact enclosure designed to meet Telcordia GR-487-CORE and CSA safety regulations. Enclosures are designed to provide a variety of power configurations and are suitable for concrete or composite pad or steel platform installation. Enclosures are available for both fuel cell and hydrogen storage. Hydrogen storage options are available on pages 17 and 18.

ReliOn E-series Fuel Cell Systems for Backup Power Applications

E-200™ Hydrogen Fuel Cell
Designed specifically for small-scale backup power applications, the E-200 fuel cell system provides up to 200W of DC power. The E-200 is fueled by hydrogen and can affordably provide hundreds of hours of highly reliable runtime for critical equipment between refueling visits.

Product	**E-200™ fuel cell**
Physical	
Dimensions (w x d x h)	3.38” x 18.75” x 17.25” / 8.6cm x 47.63cm x 43.8cm
Weight	16.5 lbs / 7.5 kg
Mounting	19” or 23” rack mount
Rated net power	200 Watts
Performance	
Rated current	16.6A @ 12VDC 8.3A @ 24 VDC 5.5A @ 36 VDC 4.1A @ 48 VDC
DC voltage (nominal)	12, 24, 36 or 48 VDC field-selectable
Fuel	
Composition	Standard industrial grade hydrogen (99.95%)
Supply pressure to unit	8 to 12 psig / 55.1 to 82.8 KPag / 0.55 to 0.83 bar operating
Operation	
Ambient temperature	23°F to 122°F / -5°C to 50°C
Relative humidity	0-95% non-condensing
Altitude	-197 ft to 13,800 ft / -60m to 4,206m
Location	Indoors (outdoors in enclosure)
Warranty	2 years or 3,000 run-hours (whichever happens first)

ReliOn E-200™ Fuel Cell Enclosure Options

Product	**4U19V**	**7U19V**
Maximum Power (kW)	200W to 400kW	200W to 600W
Height	33.1” / 84cm	39.4” / 100cm
Width	13.2” / 33.5cm	17.8” / 45.2cm
Depth	26.8” / 68cm	29.3” / 74.4cm
Weight (without chassis)	44 lbs / 19.9 kg	55 lbs / 24.9 kg
Hydrogen Storage	Multiple options available	Multiple options available
Ambient temperature	-40°F to 122°F / -40°C to 50°C	

ReliOn E-200™ Enclosure Configurations



Product	**4U19V 3Cyl80**	**4U19V 5Cyl80**	**4U19V 6Cyl300**
Maximum Number Chassis	2	2	2
Height	39.5” / 100.3cm	39.5” / 100.3cm	72” / 182.9cm
Width	24.3” / 61.7cm	30.8” / 78.2cm	38.4” / 97.5cm
Depth	26.8” / 68cm	26.8” / 68cm	35” / 88.9cm
Weight (without cylinders)	144 lbs / 65.3 kg	154 lbs / 69.8 kg	394 lbs / 178.7 kg
Hydrogen Storage	8kWh	13kWh	54kWh
Ambient temperature	-40ºF to 122ºF / -40ºC to 50ºC		



Product	**7U19V 3Cyl80**	**7U19V 5Cyl80**	**7U19V 6Cyl300**
Maximum Number Chassis	3	3	3
Height	39.5” / 100.3cm	39.5” / 100.3cm	72” / 182.9cm
Width	28.9” / 73.4cm	35.2” / 89.4cm	43.1” / 109.5cm
Depth	29.3” / 74.4cm	29.3” / 74.4cm	35” / 88.9cm
Weight (without cylinders)	155 lbs / 70.3 kg	165 lbs / 74.8 kg	405 lbs / 183.7 kg
Hydrogen Storage	8kWh	13kWh	54kWh
Ambient temperature	-40ºF to 122ºF / -40ºC to 50ºC		

E-1100™ Hydrogen Fuel Cell

Designed for backup power applications within the telecommunications, utility, transportations and government sectors, the E-1100 fuel cell system provides up to 1,100 Watts of DC power. Multiple systems may be combined for higher power or N+1 redundancy. The E-1100 is fueled by hydrogen and can affordably provide highly reliable extended runtime for critical equipment.

Product	**E-1100™ fuel cell**
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	1,100 Watts
Performance	
Rated current	46A @ 24 VDC 23A @ 48 VDC
DC voltage (nominal)	24 or 48 VDC
Fuel	
Composition	Standard industrial grade hydrogen (99.95%)
Supply pressure to unit	8 to 12 psig / 55.1 to 82.8 KPag / 0.55 to 0.83 bar operating
Operation	
Ambient temperature	23°F to 122°F / -5°C to 50°C
Relative humidity	0-95% non-condensing
Altitude	-197 ft to 13,800 ft / -60m to 4,206m
Location	Indoors (outdoors in enclosure)
Warranty	2 years or 3,000 run-hours (whichever happens first)

ReliOn E-1100™ Fuel Cell Enclosure Options

Product	**16U23**
Maximum Power (kW)	1.1kW to 4.4kW
Height	39.5” / 100.4cm
Width	28.5” / 72.4cm
Depth	45.5” / 115.6cm
Weight (without chassis)	250 lbs / 113.4 kg
Hydrogen Storage	Multiple options available
Ambient temperature	-40°F to 122°F / -40°C to 50°C

ReliOn E-1100™ Enclosure Configurations

Product	**16U23 6Cyl300**
Maximum Number Chassis	4
Height	72” / 183cm
Width	54.5” / 138.4cm
Depth	45.5” / 115.6cm
Weight (4.4kW, without cylinders)	900 lbs / 408 kg
Hydrogen Storage	54kWh
Ambient temperature	-40°F to 122°F / -40°C to 50°C

E-1100v™ Hydrogen Fuel Cell

The E-1100v fuel cell provides up to 1,100 Watts of DC power in an industry-first vertical rack-mount chassis for space-sensitive applications. The E-1100v is fueled by hydrogen and can affordably provide highly reliable extended runtime for critical equipment.

Product	**E-1100v™ fuel cell**
Physical	
Dimensions (w x d x h)	18.75” x 7.375” x 27” 47.6cm x 18.7cm x 68.6cm
Weight	63 lbs / 28.6 kg
Mounting	23” rack mount
Rated net power	1,100 Watts
Performance	
Rated current	46A @ 24 VDC 23A @ 48 VDC
DC voltage (nominal)	24 or 48 VDC
Fuel	
Composition	Standard industrial grade hydrogen (99.95%)
Supply pressure to unit	8 to 12 psig / 55.1 to 82.8 KPag / 0.55 to 0.83 bar operating
Operation	
Ambient temperature	23°F to 122°F / -5°C to 50°C
Relative humidity	0-95% non-condensing
Altitude	-197 ft to 13,800 ft / -60m to 4,206m
Location	Indoors (outdoors in enclosure)
Warranty	2 years or 3,000 run-hours (whichever happens first)

ReliOn E-1100v™ Fuel Cell Enclosure Options

Product	**16U20v**
Maximum Power (kW)	1,100W
Height	38” / 96.5cm
Width	26” / 66cm
Depth	16.1” / 40.9cm
Weight (without chassis)	65 lbs / 29.5 kg
Hydrogen Storage	Multiple options available
Ambient temperature	-40°F to 122°F / -40°C to 50°C

ReliOn E-1100v™ Enclosure Configurations

Product	**16U20v-6Cyl300**
Maximum Number Chassis	1
Height	72” / 183cm
Width	41.3” / 105cm
Depth	34.3” / 87.12cm
Weight (without cylinders)	548lbs / 248.5kg
Hydrogen Storage	54 kWh
Ambient temperature	-40°F to 115°F / -40°C to 46°C

E-2500™ Hydrogen Fuel Cell

The E-2500™ fuel cell system provides 2,500W of power in a compact, rack-mountable package. E-2500™ PEM technology has been optimized for higher power traditional backup and emergency power applications. Multiple systems may be combined, allowing for power configurations up to 10kW in one environmentally-hardened outdoor enclosure.

Product	**E-2500™ fuel cell**
Physical	
Dimensions (w x d x h)	21.34” x 24” x 14” 54.2cm x 61cm x 35.6cm
Weight	113 lbs / 51.4 kg
Mounting	23” rack mount
Rated net power	2,500 Watts
Performance	
Rated current	105A @ 24 VDC 52.5A @ 48 VDC
DC voltage	24 or 48 VDC nominal
Fuel	
Composition	Standard industrial grade hydrogen (99.95%)
Supply pressure to unit	8 to 12 psig / 55.1 to 82.8 KPag / 0.55 to 0.83 bar operating
Operation	
Ambient temperature	23°F to 122°F / -5°C to 50°C
Relative humidity	0-95% non-condensing
Altitude	-197 ft to 13,800 ft / -60m to 4,206m
Location	Indoors (outdoors in enclosure)
Warranty	2 years or 3,000 run-hours (whichever happens first)

ReliOn E-2500™ Fuel Cell Enclosure Options

Product	**16U23**	**32U23**
Maximum Power (kW)	2.5kW or 5kW	2.5 to 10kW
Height	39.5” / 100.4cm	72” / 183cm
Width	28.5” / 72.4cm	28.5” / 72.4cm
Depth	45.5” / 115.6cm	49.8” / 126.5cm
Weight (without chassis)	250 lbs / 113.4 kg	315 lbs / 142.9kg
Hydrogen Storage	Multiple options available	Multiple options available
Ambient temperature	-40ºF to 122ºF / -40ºC to 50ºC	

ReliOn E-2500™ Enclosure Configurations

Product	**16U23**	**32U23**
Maximum Number Chassis	2	4
Height	72” / 183cm	72” / 183cm
Width	54.5” / 138.4cm	53.75” / 136.5cm
Depth	45.5” / 115.6cm	49.8” / 126.5cm
Weight (without cylinders)	900 lbs / 408.2 kg (5kW)	1,290 lbs / 585 kg (10kW)
Hydrogen Storage	54kWh	54kWh
Ambient temperature	-40ºF to 122ºF / -40ºC to 50ºC	

ReliOn E-series Fuel Cell Systems for Grid Support/High Duty Cycle Applications

E-1000x™ Hydrogen Fuel Cell

The E-1000x™ hydrogen fuel cell is designed for grid support and high duty cycle customer applications. It offers robust reliability and comes with an industry-leading warranty, providing extended runtime for critical equipment. The E-1000x™ fuel cell system produces DC power for equipment needing up to 1,000 Watts in a compact rack-mount chassis. Multiple systems may be combined for higher power applications and N+1 redundancy.

Product	**E-1000x™ fuel cell**
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	1,000 Watts
Performance	
Rated current	42A @ 24 VDC 21A @ 48 VDC
DC voltage	24 or 48 VDC nominal
Fuel	
Composition	Standard industrial grade hydrogen (99.95%)
Supply pressure to unit	8 to 12 psig / 55.1 to 82.8 KPag / 0.55 to 0.83 bar operating
Operation	
Ambient temperature	23°F to 122°F / -5°C to 50°C
Relative humidity	0-95% non-condensing
Altitude	-197 ft to 13,800 ft / -60m to 4,206m
Location	Indoors (outdoors in enclosure)
Warranty	5 years or 8,000 run-hours (whichever happens first)

ReliOn E-1000x™ Fuel Cell Enclosure Options

Product	**16U23**
Maximum Power (kW)	1kW to 4kW
Height	39.5” / 100.4cm
Width	28.5” / 72.4cm
Depth	45.5” / 115.6cm
Weight (without chassis)	250 lbs / 113.4 kg
Hydrogen Storage	Multiple options available
Ambient temperature	-40°F to 122°F / -40°C to 50°C

ReliOn E-1000x™ Enclosure Configurations

Product	**16U23 6Cyl300**
Maximum Number Chassis	4
Height	72” / 183cm
Width	54.5” / 138.4cm
Depth	45.5” / 115.6cm
Weight (4kW without cylinders)	900 lbs / 408 kg
Hydrogen Storage	54kWh
Ambient temperature	-40°F to 122°F / -40°C to 50°C

E-2200x™ Hydrogen Fuel Cell

The E-2200x™ hydrogen fuel cell is designed for grid support and high duty cycle customer applications. It offers robust reliability and comes with an industry-leading warranty, providing extended runtime for critical equipment. The E-2200x™ fuel cell system produces up to 2,200 Watts of DC power in a compact rack-mount chassis. Multiple systems may be combined for higher power applications and N+1 redundancy.

Product	**E-2200x™ fuel cell**
Physical	
Dimensions (w x d x h)	21.34” x 24” x 14” 54.2cm x 61cm x 35.6cm
Weight	113 lbs / 51.4 kg
Mounting	23” rack mount
Rated net power	2,200 Watts
Performance	
Rated current	93A @ 24 VDC 46.5A @ 48 VDC
DC voltage	24 or 48 VDC nominal
Fuel	
Composition	Standard industrial grade hydrogen (99.95%)
Supply pressure to unit	8 to 12 psig / 55.1 to 82.8 KPag / 0.55 to 0.83 bar operating
Operation	
Ambient temperature	23°F to 122°F / -5°C to 50°C
Relative humidity	0-95% non-condensing
Altitude	-197 ft to 13,800 ft / -60m to 4,206m
Location	Indoors (outdoors in enclosure)
Warranty	5 years or 8,000 run-hours (whichever happens first)

ReliOn E-2200x™ Fuel Cell Enclosure Options

Product	**16U23**	**32U23**
Maximum Power (kW)	2.2kW or 4.4kW	2.2 to 8.8kW
Height	39.5” / 100.4cm	72” / 183cm
Width	28.5” / 72.4cm	28.5” / 72.4cm
Depth	45.5” / 115.6cm	49.8” / 126.5cm
Weight (without chassis)	250 lbs / 113.4 kg	315 lbs / 142.9kg
Hydrogen Storage	Multiple options available	Multiple options available
Ambient temperature	-40ºF to 122ºF / -40ºC to 50ºC	

ReliOn E-2200x™ Enclosure Configurations

Product	**16U23 6Cyl300**	**32U23 6Cyl300**
Maximum Number Chassis	2	4
Height	72” / 183cm	72” / 183cm
Width	54.5” / 138.4cm	53.75” / 136.5cm
Depth	45.5” / 115.6cm	49.8” / 126.5cm
Weight (without cylinders)	900 lbs / 408.2 kg (5kW)	1,290 lbs / 585 kg (10kW)
Hydrogen Storage	54kWh	54kWh
Ambient temperature	-40ºF to 122ºF / -40ºC to 50ºC	

Hydrogen Storage Solutions

Plug Power offers a variety of fuel storage options in order to provide a robust power system with enough runtime to meet site requirements. One and two-stage hydrogen control options are available for all hydrogen storage cabinets.

6Cyl300 fuel cabinet
The 6-cylinder fuel cabinet provides storage for six standard “300” hydrogen cylinders. The cabinet is powder-coated aluminum, meeting Telcordia GR-487-CORE requirements and is appropriate for Seismic Zone 4 locations. Front and rear swing doors allow access for cylinder swaps during refueling. Multiple six cylinder fuel cabinets may be located at a site in order to provide more runtime.

3Cyl80 fuel cabinet
The 3-cylinder fuel cabinet provides storage for three standard “80” hydrogen cylinders. The cabinet is powder-coated aluminum, meeting Telcordia GR-487-CORE requirements and is appropriate for Seismic Zone 4 locations. Front door allows access for cylinder swaps during refueling. The fuel storage volume in this product falls below 400 cubic feet, keeping it under the exemption limit expressed in NFPA55 and the International Fire Code.

5Cyl80 fuel cabinet
The 5-cylinder fuel cabinet provides storage for five standard “80” hydrogen cylinders. The cabinet is powder-coated aluminum, meeting Telcordia GR-487-CORE requirements and is appropriate for Seismic Zone 4 locations. Front door allows access for cylinder swaps during refueling. The fuel storage volume in this product falls below 400 cubic feet, keeping it under the exemption limit expressed in NFPA55 and the International Fire Code.

Product	**6Cyl300**	**3Cyl80**	**5Cyl80**
Height	72” / 183 cm	39.4” / 100 cm	39.4” / 100 cm
Width	26” / 66 cm	26.75” / 67.9 cm	26.75” / 67.9 cm
Depth	35” / 89 cm	11” / 27.9 cm	17.6” / 44.7 cm
Weight	350 lbs / 159kg	100 lbs / 45.4 kg	110 lbs / 50 kg
*Hydrogen Storage @ 2,400 psi	54 kWh	8 kWh	13 kWh

*Fuel consumption rate depends on product

HSM16 fuel cabinet
The HSM16 (available only in the U.S.) is also used with the bulk refueling model. This cabinet provides space for sixteen (16) 510 scf @ 3,000 psi hydrogen cylinders. Lockable lift-off doors secure the hydrogen cylinders against the environment.

HSM9 fuel cabinet
The HSM9 (available only in the U.S.) is also used with the bulk refueling model. This cabinet provides space for nine (9) 510 scf @ 3,000 psi hydrogen cylinders. Lockable lift-off doors secure the hydrogen cylinders against the environment.

Fuel storage packs
Plug Power's ReliOn fuel cell enclosures may be accessorized with an external port which provides a connection to a standard 12/15/16 pack cage for temporary storage. These hydrogen storage packs are available through many industrial gas suppliers and provide up to 128 kWh of runtime each.

Product	**HSM16**	**HSM9**
Height	72" / 183 cm	73.63" / 187 cm
Width	52" / 132 cm	39.5" / 100.3 cm
Depth	56" / 142.3 cm	50.17" / 127.4 cm
Weight	6,200 lbs / 2,818 kg	3,280 lbs / 1,488 kg
*Hydrogen Storage @ 2,400 psi	225 kWh	134 kWh
*Hydrogen Storage @ 3,000 psi	281 kWh	167 kWh

*Fuel consumption rate depends on product

GenCare Services

Plug Power offers a comprehensive set of services designed to complement our robust ReliOn fuel cell products. From site audit to installation, refueling to maintenance, Plug Power's GenCare organization is ready to work for you.

Planning
- Site assessment
- Design and planning
- Project management

Pre-installation audits feature site power analysis, site layout parameters, battery analysis and other issues.

Installation & Commissioning
Basic fuel cell site design and installation and turnkey installations are offered. Fuel cell permit acquisition is a specialty. Post-installation audit offerings typically include inspection of customer-provided installations, commissioning of equipment, alarm activation and verification.

Operations & Maintenance
Make maintenance our concern instead of yours. Offerings include systems monitoring, extended warranty, upgrade services and ongoing maintenance programs.

24/7 Technical Assistance Center
Plug Power provides a team of highly professional engineers and technicians, having extensive knowledge in communications technologies as well as deep understanding of ReliOn fuel cell product operation. Team members are available 24/7 to assist in answering technical questions and troubleshooting.

Factory and On-site Training
ReliOn product training is designed for those who are responsible for the design, acquisition, installation, operation or maintenance of hydrogen fuel cell backup power systems. Factory training is offered at our Spokane, Washington office. Train-the-trainer and on-site classes are also available.

Ordering Information

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