

Fuel Cell Power Generation

HyPM™ Rack

10, 20 & 30 kW

Clean, reliable, cost effective power for backup, stand-by, and peak shaving stationary applications. A clean alternative to batteries and generators.

A more reliable form of critical stationary backup and stand-by power is now available.

For mission critical data center and telecommunication operations where downtime from grid interruptions is costly, and renewable energy applications where the challenges of intermittent power must be solved – HyPM™ Rack fuel cell solutions provide highly-reliable, clean, extended-run hydrogen based power generation.

HyPM™ Racks can replace or augment both batteries and diesel generators, can be used for indoor or outdoor applications, and can deliver DC power or can be combined with an inverter or UPS for AC power.

Applications

- Backup power for mission critical data centers and telecommunication operations
- Grid connected and/or standalone renewable energy applications

Benefits

- Lower total cost of ownership
- High reliability
- Compact
- Zero emission
- Quiet operation
- High efficiency
- Easy to integrate and install

Features

- Replaces or augments both batteries and diesel generators
- Approved for indoor or outdoor installations
- Delivers DC power or can be combined with an inverter or UPS for AC power
- Load following
- Scalable and modular (10 kW increments)
- Extended run backup power
- Optional remote monitoring
- Limited moving parts and low maintenance
- Built-in display and user interface
- Built-in protective circuit breakers and fusing
- Built-in MultiPacking of 2 - 20 units



HyPM™ Rack Solution offers:

Fuel Cell technology for increased availability and runtime.

Lower Lifecycle Costs

- Lower total cost of ownership compared with batteries and diesel generators for runtimes exceeding two hours

High Reliability

- Unlimited start/stop cycles
- Built-in advanced diagnostics and controls
- Pre-engineered systems
- Mechanically simple
- Few moving parts

Compact Footprint

- HyPM™ Racks lead the industry for power delivery on a volume and weight basis
- Small footprint with high runtime capabilities
- Perfect for sites with no room for extended run batteries and no space for a gen-set
- Indoor inline installation
- Energy storage can be placed outside of the building, making more available space versus batteries

Zero Emissions

- Safe operation in emission-restricted work environments – indoor and outdoor
- Byproducts when the system is running are only heat and water
- Low audible noise
- No transmitted vibration

High Efficiency

- Peak fuel cell power module efficiency is greater than 50%

Ease of Integration

- Modular products for flexible, versatile applications
- Simple electrical and mechanical interfaces that integrate with OEM and end-user applications

Scalable and Modular

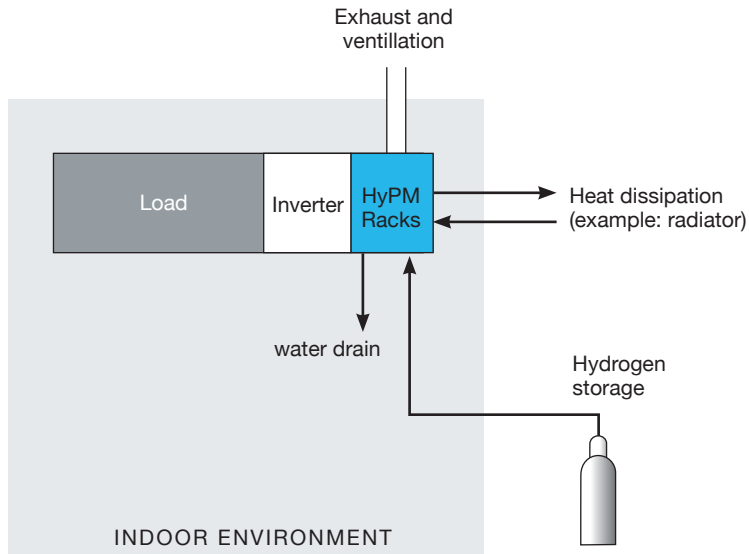
- 19-inch server room equipment rack platform
- Runtime can be indefinite with additional hydrogen storage
- Up to 3 modules of 10 kW can be installed in a single rack
- Multiple racks can be combined to reach 1 MW and greater
- Onsite upgradeable from 10 to 20 kW to 30 kW

Highly Robust

- No performance decay when not in use, shelf-life of 20 years
 - No performance decay due to start-up/shut-down cycling
 - No performance decay from indoor ambient temperature influences
 - No periodic start-up requirement
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HyPM Fuel Cell Rack Solution



Fuel Cell Installation

- Installed indoor close to the load
- Hydrogen stored in standard bottles to feed to the fuel cell rack
- Fuel Cell Management system handles control, monitoring, and safety functions
- The installation includes a water drain and hot air ventilation

System Components

- Control module: single control module for up to 30 kW
- DC/DC converter module: boost to +/- 192 VDC / 384 VDC
- Power Module: 3 x 10 kW fuel cell power modules per 19 in. rack
- Cooling and water management: HyPM™ Rack is equipped with standard interfaces for multiple cooling options



HyPM Fuel Cell Rack Solution: 10, 20 & 30 kW

Fuel Cell

Power Multiples of 10, 20, or 30 kW
DC Voltage +/- 192 VDC / 384 VDC

Configuration

Fuel Cells 1, 2, or 3 10 kW Modules per 19 in. rack
DC/DC converters One converter per fuel cell module

Fuel

Composition 99.99% dry gaseous hydrogen
Storage Pressurized bottles

Environment

Audible noise 45 db (stand by), 60 db (Idling),
75 db (full power), one meter distance
Emissions Water and heat

Installation

Fuel Cell Typically indoor
Hydrogen bottles Typically outdoor
Heat dissipation Radiator or chilled water
(15 kW per module at full load)

Dimensions

Rack (H x D x W) 42 U, 2000 x 1070 x 600 mm
78.7 x 42.1 x 23.6 in
Weight 10 kW = 400 kg / 880 lbs
20 kW = 525 kg / 1155 lbs
30 kW = 650 kg / 1430 lbs

Runtime

10 kW with 1 standard industrial bottle 60 minutes at full load
30 kW with 12 standard industrial bottles 4 hours at full load



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