

THE INDUSTRY BENCHMARK FOR  
**DURABLE, ZERO EMISSION**  
MOBILITY

**HYDROG(E)NICS**

SHIFT POWER | ENERGIZE YOUR WORLD

**HD POWER MODULES**

For light and heavy duty mobility

## WHY CHOOSE HYDROGENICS HD POWER MODULES?

**Tried, tested and proven solutions for zero-emission mobility.**

### **Liquid-cooled advanced MEA PEM stack**

- Integral Balance of Plant
- Advanced onboard controls and diagnostics
- Low pressure cathode air delivery
- -40°C sub-zero shutdown capability
- Rapid start-up and dynamic response
- Unlimited start-stop cycling
- Robust, rugged and reliable
- No water required (for humidification)
- No nitrogen purge requirement
- Designed for ease of UL and CE system certifications

### **Additional 'inside the box' features reduce challenges for integrators**

- Air delivery sub-systems
- Integrated hydrogen regulation
- Anti-flood/dry protection

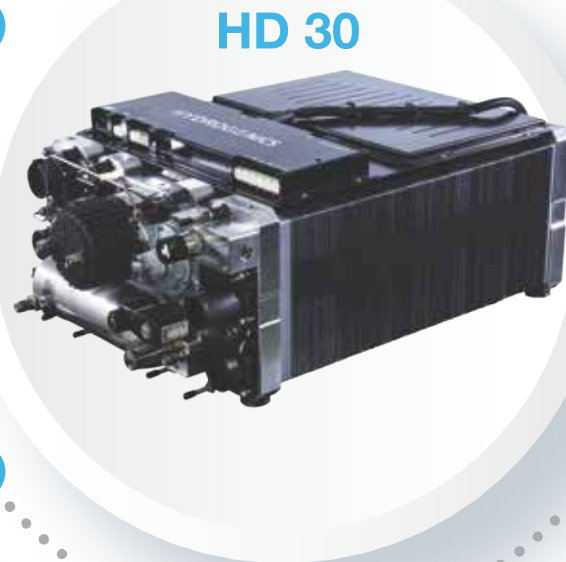
### **And useful options:**

- Overall system controller
- Busbar/contacter kit
- Thermal management sub-system
- Fluid heating for multi-unit configurations



# HYDROGENICS

Our HD Power Modules are cost-effective and reliable for battery electric mobility applications



HD 30



**Low Temperature Starts**  
Can be stored and operated in temperatures as low as -40°C degrees without fear of damage or failure.



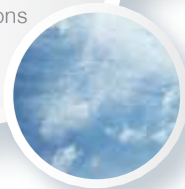
**Fuel Cell Management System (FCMS)**  
Our proprietary operating software maximizes performance and optimizes lifespan.



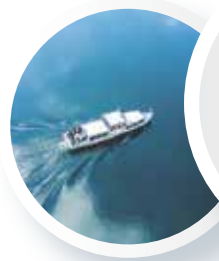
**Fully Integrated System**  
One compact fuel cell system for easy, seamless integration, without the need for additional components.



**Compact size**  
for space constrained applications



**Water-Free Operation**  
Our fuel cells do not require water for humidification. With no residual water, there's no risk of freezing or moisture issues.



**Unlimited Start/Stop Cycles**  
Hydrogenics' fuel cells can be turned on and off as needed without degradation.



## Improved 3rd Generation HD Power Modules

### Flexible, rugged and streamlined

- Next generation OS: intelligent Fuel Cell Management System (FCMS)
- Streamlined, rugged recirculation pump and controller
- Improved durability in sub-zero, high-vibration, and high stress environments
- Improved electrical isolation
- Streamlined piping for pressure stability and sub-zero performance
- Flexible heating options (electrical- and fluid-based)

## Introducing the HD 50

### Built on our industry-leading architecture

- High output, single stack
- 50kW net power
- Increased power-to-weight ratio
- Streamlined high power architecture
- Industry-leading small footprint, high power density
- Combine units for higher output with fewer stacks
- Available in single-blower, 45kW configuration (HD45)



## Hydrogenics HD Power Modules:

### Flexible, Rugged And Streamlined

Hydrogenics merges its stack with a balance-of-plant into a fully integrated, streamlined unit, resulting in our **easy-to-implement** HD Power Modules. Our proven low-pressure Proton Exchange Membrane (PEM) fuel cell architecture is at the core of our HD lineup.

Our HD Power Modules are designed to deliver superior **performance, durability** and **reliability**. We bring our integration experience to help you get the most out of your fuel cell system.

## A Track Record Of Success:

### Proven Technology

We consistently deliver value for the customers we work with — primarily OEMs and system integrators — whose needs often differ from the mass market. Driven to understand what is most important to your business, we use our experience and expertise to design adaptable hydrogen solutions that are superior to any off-the-shelf solution. Our flexible HD Power Module platform allows us to customize applications based on your needs, while remaining cost-competitive with generic solutions.

In the end it's all about proven, reliable and standards-based technology. With our global market experience, our engineering expertise and our best-in-class service personnel, OEMs count on us for a **safe** and **reliable** solution every time.

## The Human Factor:

### Putting Customers First

At Hydrogenics, we are in the business of helping our customers succeed. Our hydrogen experts have delivered time and again, helping our customers achieve their remarkable goals. From the **first** hydrogen-powered passenger train to the **first** fuel cell powered airplane and more, **we put customers first**.

World-leading  
fuel cells  
for the world's **first**  
hydrogen  
commuter train.



HD 50



Delivered equipment  
for over 55 hydrogen  
fueling stations to  
support the growth in  
**fuel cell electric**  
vehicles.



# TECHNICAL SPECIFICATIONS



Technical Data	HD 8	HD 10	HD 15	HD 30	HD 50	CELERITY	HD 90	<p>High power configurations</p> <p>Multiple <b>HD30</b> or <b>HD50</b> units can be combined for higher outputs</p>
Continuous Power (kW)	8.5	10.5	16.5	31	51	60	93	
Dimensions (LxWxH) (mm)	379 x 406 x 261 <sup>b</sup>	408 x 406 x 261 <sup>b</sup>	494 x 406 x 261 <sup>b</sup>	719 x 406 x 261 <sup>b</sup>	973 x 406 x 261 <sup>b</sup>	800 x 375 x 980	1582 x 1085 x 346 <sup>a</sup>	
Volume (L)	41 <sup>b</sup>	44 <sup>b</sup>	52 <sup>b</sup>	76 <sup>b</sup>	103 <sup>b</sup>	290	594 <sup>a</sup>	
Mass <sup>a</sup> (kg)	52	47	55	72	110	275	360	
Operating Current (A <sub>dc</sub> )	0...380	0...425	0...425	0 to 500	0 to 450	0 to 200	0 to 500	
Operating Voltage (V <sub>dc</sub> )	20...40	24...48	32...64	60...120	108...220	300...640	180...360	
Peak Efficiency <sup>a</sup> (% <sub>LHV</sub> )	51	53	53	59 <sup>c</sup>	59 <sup>c</sup>	53	53	
Expected Lifetime (h)	10 000+	10 000+	10 000+	10 000+	10 000+	10 000+	10 000+	
	Available in lightweight, higher voltage and aerospace configurations				Available in 45kW configuration (HD 45)			

<sup>a</sup>) Coolant pump excluded

<sup>b</sup>) Coolant pump and air delivery excluded

<sup>c</sup>) Not including externally powered blower

The above data is for reference only and is subject to change without notice. © Hydrogenics 02-2019

**HYDROGENICS**

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