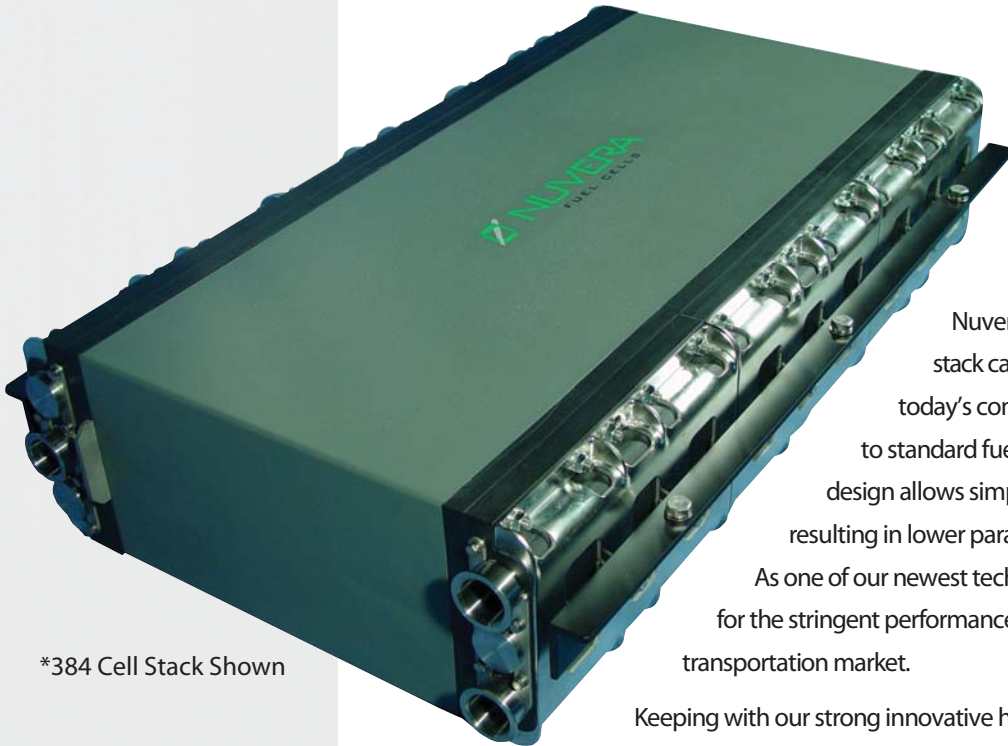


ANDROMEDA™

HCS-575 PEM Fuel Cell Stack Series



*384 Cell Stack Shown

Nuvera has developed an advanced fuel cell stack called Andromeda™ in order to simplify today's complex fuel cell power systems. In contrast to standard fuel cell system architectures, the Andromeda design allows simplification of the balance of plant hardware resulting in lower parasitic losses and fewer control parameters.

As one of our newest technologies, Andromeda is designed specifically for the stringent performance, volume, and weight requirements of the transportation market.

Keeping with our strong innovative heritage, Nuvera is the only metal stack manufacturer that is capable of using uncoated metal plates, which offer cost advantages during manufacturing.

At the present time, Andromeda is available to customers with transportation fuel cell stack integration capabilities for prototype testing, product development, and fleet testing initiatives.

Product Features

Scaleable and Modular Andromeda is available in custom configurations as low as 24 cells and as high as 384 cells. Its compact size makes it suitable wherever high power and a small footprint are needed, such as APU's, traction power, marine and aerospace applications.

Low Pressure Operation The Nuvera stack architecture, which has been extensively developed over the past ten years, has the ability to operate with very low pressure drop allowing for the use of a lower cost air blower instead of a standard compressor.

No External Humidification In order to reduce the number of heat exchange loops to a minimum, Nuvera has pioneered the use of a fuel cell stack technology that uses dry air and hydrogen as inputs, which reduces the heat exchange loops from three to one.

Metallic Bipolar Plates Metallic stacks are best suited for transportation applications because of their resistance to shock and vibration and are significantly lower in manufacturing cost than graphite stacks.



Future Technology



Passenger Cars and Trucks



Buses



Marine Applications



Aviation/Aerospace

Specifications	150 Cell	272 Cell	384 Cell
Stack Power	50kW ± 4	90kW ± 4	127kW ± 4
Stack Operating Voltage	130 – 90V ± 10	235 – 165V ± 10	335 – 235V ± 10
Transient Response	10% - 90% < 2 sec	10% - 90% < 2 sec	10% - 90% < 2 sec
Stack Dimensions	210(h) x 300 x 570 mm	210(h) x 600 x 535 mm	210(h) x 900 x 515 mm
Stack Weight	58kg ± 10kg	107kg ± 10kg	155kg ± 10kg

Coolant

*custom configurations available

Type	Demi Water or Low Conductivity Glycol		
Conductivity	< 5 pS/cm		
Flow Rate	120 lpm ± 6	220 lpm ± 6	310 lpm ± 10
Pressure Drop	400 mbar ± 200		
T In Max	62°C ± 2		
T Out Max	70°C ± 2		

Fuel

Type ¹	Hydrogen 99.995%
RH% In ²	Dry Hydrogen Input
H2 Stoich	3 ± 1
H2 Pressure	1.1 – 1.8 bar absolute
H2 Pressure Drop ^{2,3}	150 mbar ± 50

Oxidant

Type	Air
Air Inlet Pressure	1.1 – 1.8 bar abs
Air Pressure Drop ^{3,4}	400 mbar ± 100
Air Stoich @ low current density	2.5 ± 0.5
Air Stoich @ high current density	1.7 ± 0.1
T In	<50°C
T Max Out	70°C ± 2

1 Impurities to be approved by Nuvera

2 Requires use of hydrogen recirculation pump

3 Pressure drops estimated at max power

4 Pressure drops with inlet pressure equal to 1,8 bar absolute

All specifications are specified at beginning of operational life. Specifications and descriptions in this document were in effect at the time of publication. Nuvera Fuel Cells, Inc. reserves the right to change specifications, product appearance, or product availability at any time.



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