



# M Series

## Hydrogen Generation Systems

MODEL	M100	M200	M400
	Fully-automated MW-class on-site hydrogen generator utilizing a modular skid-based design. Tri-mode operation (selectable):		
	<ul style="list-style-type: none"> <li>• Command-following mode allows operation based on available input power.</li> <li>• Load Following mode automatically adjusts output 0-100% to match demand.</li> <li>• Tank Filling mode operates with power-conservation mode during standby.</li> </ul>		
<b>ELECTROLYTE</b>	Proton Exchange Membrane (PEM) - caustic-free		
<b>HYDROGEN PRODUCTION</b>			
Net Production Rate			
Nm <sup>3</sup> /hr @ 0°C, 1 bar	104 Nm <sup>3</sup> /hr	209 Nm <sup>3</sup> /hr	417 Nm <sup>3</sup> /hr
SCF/hr @ 70°F, 1 atm	3970 SCF/hr	7970 SCF/hr	15882 SCF/hr
SLPM @ 70°F, 1 atm	1874 SLPM	3762 SLPM	7495 SLPM
kg per 24 hours	225 kg/24hr	452 kg/24hr	902 kg/24hr
Delivery Pressure - Nominal	30 barg / 435 psig; Full Differential Pressure H <sub>2</sub> Over O <sub>2</sub>		
Hydrogen Purity	> 99.9% Water Vapor < 500 ppm, N <sub>2</sub> < 2 ppm, O <sub>2</sub> < 1 ppm, All others undetectable		
With Optional High Purity Dryer	ISO 14687-1:1999 Type 1 Grade C / ISO 14687-2:2012 Type 1 grade D > 99.9995% Water Vapor < 2 ppm, N <sub>2</sub> < 2 ppm, O <sub>2</sub> < 1 ppm, All others undetectable		
<b>ELECTRICAL POWER CONSUMPTION</b>			
MW's @ Cell Stack(s)	0.51	1.0	2.1
MW's @ System	0.55	1.1	2.2
Power Consumed per Volume of Mass H <sub>2</sub> Gas Produced <sup>1</sup>	5.3 kWh/Nm <sup>3</sup> 59 kWh/kg		
<b>SYSTEM OPERATION</b>			
Start-Up Time (from Off State)	<5 min		
Turndown Range	10 to 100% (Input Power Mode); 0 to 100% (H <sub>2</sub> Demand Mode)		
Ramp-Up Time (Minimum to Full Load)	<10 Sec		
Ramp Rate (% of Full-Scale)	≥ 15% per sec ( Power Input Mode)		
Upgradeability	Upgradeable in 250 kW (52 Nm <sup>3</sup> /hr) Increments		
<b>DI WATER REQUIREMENT</b>			
Consumption Rate at Maximum Production	93 L/hr 25 gal/hr	187 L/hr 49 gal/hr	373 L/hr 99 gal/hr
Maximum Inlet Flowrate	187 L/hr 49 gal/hr	373 L/hr 99 gal/hr	747 L/hr 197 gal/hr
Temperature	5°C to 40°C / 41°F to 104°F		
Input Water Quality	ISO 3696 Grade 2 Deionized Water required, < 1 micro Siemen/cm (> 1 MegOhm-cm) ISO 3696 Grade 1 Deionized Water recommended, < 0.1 micro Siemen/cm (> 10 MegOhm-cm)		

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<b>PHYSICAL CHARACTERISTICS- MASS (KG)</b>			
Classified Area			
Water Circulation Skid (Operating)	5163	5481	10403
H2 Gas Management Skid	909	909	909
Unclassified Area			
Power Conversion Assembly (each)	6500	6500	6500
Power Conversion Quantity	1	2	4
MCC	909	909	909
Controls	300	300	300

<b>PHYSICAL CHARACTERISTICS -DIMENSIONS (MM)</b>			
Classified Area			
Water Circulation Skid	7197 W x 820 D x 2563 H	7197 W x 820 D x 2563 H	9918 W x 820 D 2141 H
H2 Gas Management Skid	3317 W x 575 D x 2083 H	3317 W x 575 D x 2083 H	3317 W x 575 D x 2083 H
Unclassified Area			
Power Conversion Assembly (each)		6200 W x 1200 D x 2850 H	
MCC		2032 W x 549 D x 2210 H	
Controls		1550 W x 382 D x 2190 H	

<b>ENVIRONMENTAL CONSIDERATIONS</b>	
Standard Siting Location	Indoor, 10-90% RH non-condensing for Classified & Unclassified Equipment Outdoor Siting Options Available
Storage/Transport Temperature	5°C to 60°C / 41°F to 140°F
Ambient Temperature Range	10°C to 40°C / 50°F to 104°F
Altitude Range-Sea Level	1000 m /3281 ft

<b>ELECTRICAL SPECIFICATIONS</b>	
Electrical specification	Typical installation: 10 kV and 20 kV, 3 phase + Neutral, 50Hz/60Hz; For lower voltage connection, consult Proton Applications Engineering Department for specific requirements and options. Ancillary equipment powered by Customer or optionally powered by Proton OnSite
Power Quality	Designed to German TAB Specification

<b>OPTIONS</b>		
• Factory Matched RO/DI Water System	• Dew Point Monitoring	• Air Compressor
• Factory Matched Cooler/Chiller	• High Purity Hydrogen Dryer	• Containerization

Specifications are subject to change. Please contact Proton OnSite for solutions to best fit your needs.



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