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PROTON® PEM

H Series

Hydrogen Generation Systems

MODEL	H2	H4	H6
Description	On-site hydrogen generator in an integrated, automated, site-ready enclosure Load Following operation automatically adjusts output to match demand Full differential pressure, H_2 over O_2		
Electrolyte	Proton Exchange Membrane (PEM) – Caustic-Free		
HYDROGEN PRODUCTION			
Nominal Production Rate Nm^3/h @ 0°C, 1 bar SCF/h @ 70°F, 1 atm SLPM @ 70°F, 1 atm kg/24 h	2 Nm^3/h 76 SCF/h 35.8 SLPM 4.31 kg/24 h	4 Nm^3/h 152 SCF/h 71.7 SLPM 8.63 kg/24 h	6 Nm^3/h 228 SCF/h 107.6 SLPM 12.94 kg/24 h
Delivery Pressure – Nominal	15 barg (218 psig); Optional 30 barg (435 psig)		
Power Consumption by System per Volume of H_2 Gas Produced[1]	7.3 kWh/Nm^3 (19.2 kWh/100 ft^3)	7.0 kWh/Nm^3 (18.5 kWh/100 ft^3)	6.8 kWh/Nm^3 (17.8 kWh/100 ft^3)
Purity (Concentration of Impurities)	99.9995% [H_2O < 5 ppm, -65°C (-85°F) Dew Point, N_2 < 2 ppm, O_2 < 1 ppm, all others undetectable]		
Turndown Range	0-100% net product delivery (automatic)		
Upgradeability	Field upgradeable to a maximum of 6 Nm^3/h (228 SCF/hr)		N/A
DI WATER REQUIREMENT			
Consumption Rate at Maximum Production	1.83 L/h (0.50 gal/h)	3.66 L/h (0.96 gal/h)	5.50 L/h (1.42 gal/h)
Temperature	5-50°C (41-122°F)		
Pressure	1.5-4 barg (21.8 to 58 psig)		
Input Water Quality	Required: ASTM Type II Deionized Water, < 1 µS/cm (> 1 MΩ-cm) Preferred: ASTM Type I Deionized Water, < 0.1 µS/cm (> 10 MΩ-cm)		
HEAT LOAD AND COOLANT REQUIREMENT			
Coolant[2]	Liquid-cooled; non-freezing, non-fouling; 5-35°C (41-95°F); 25°C cooling water maximum for ambient temperatures above 40°C		
Maximum Heat Load (Cooling Requirement)	8.1 kW (27,368 BTU/h) (2.3 tons refrigeration)	16.1 kW (54,936 BTU/h) (4.6 tons refrigeration)	23.7 kW (80,868 BTU/h) (6.8 tons refrigeration)
Coolant Flowrate	Up to 45 L/min (12 gal/min)	Up to 68 L/min (18 gal/min)	Up to 87 L/min (23 gal/min)
Pressure Drop (at Full Flow)	Up to ~3.4 barg (~50 psig)	Up to ~3.4 barg (~50 psig)	Up to ~3.4 barg (~50 psig)
ELECTRICAL SPECIFICATIONS			
Maximum Power Required within Expected System Life	22 kVA	38 kVA	55 kVA
Electrical Requirements	480 VAC, three phase, 60 Hz or 380-415 VAC, three phase, 50 Hz		

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INTERFACE CONNECTIONS – CONSULT INSTALLATION MANUAL FOR DETAILS				
H_2 Product Port		1/4" Parker CPI™ compression tube fitting, SS		
H_2 Vent Port		1/2" FNPT, SS		
DI Water Port		1/4" FNPT, SS		
Calibration-Gas Port		1/8" FNPT, brass		
Coolant Supply and Return Ports		1" FNPT, brass		
Drain Port		3/8" FNPT, brass		
Electrical		Connect to on-board circuit breaker		
Communications		Ethernet, 24 VDC dry contacts		
CONTROL SYSTEMS				
Standard Features		• Fully automated, push button start/stop • Automatic fault detection and system depressurization • E-stop • Remote start/stop • On-board H_2 leak detection • Remote communications		
Remote Shutdown		Hardwire input to safety PLC		
PHYSICAL CHARACTERISTICS				
Dimensions W x D x H	Product Est. Shipping	180 cm x 81 cm x 191 cm (71" x 32" x 75") 206 cm x 104 cm x 216 cm (81" x 41" x 85") Note: Add 8 cm (3") to height for installed lifting brackets.		
Weight	Product Est. Shipping	682 kg (1,500 lbs) 807 kg (1,776 lbs)	727 kg (1,600 lbs) 858 kg (1,887 lbs)	773 kg (1,700 lbs) 908 kg (1,998 lbs)
IP Rating		IP66 for electronics compartment. IP43 for fluids compartment; Upgradeable to IP56.		
ENVIRONMENTAL CONSIDERATIONS – DO NOT FREEZE				
Standard Siting Location		Indoor, level ± 1°, 0-90% RH non-condensing, non-hazardous/non-classified environment		
Storage/Transport Temperature		5-60°C (41-140°F)		
Ambient Temperature Range		5-50°C (41-122°F)		
Altitude Range – Sea Level		2,400 m (7,874 ft)		
Ventilation		Proper ventilation must be provided from a non-hazardous area at a rate in accordance with IEC60079-10, Zone 2 NE		
SAFETY AND REGULATORY CONFORMITY				
Maximum On-board H_2 Inventory at Full Production		0.040 Nm^3 @ 15 barg; 0.08 Nm^3 @ 30 barg 1.5 SCF @ 15 barg; 2.9 SCF @ 30 barg 0.0036 kg @ 15 barg; 0.0069 kg @ 30 barg		
Cabinet Ventilation with Environment		NFPA 69 and EN 1127-1, Clause 6.2 Vent fan draws fresh air up to 28 Nm^3/min (1,000 ft^3/min)		
Noise dB(A) at 1 Meter		< 83		
Conformity		cTUVus (UL and CSA equivalent), CE (PED, Mach. Dir., EMC), ISO 22734-1		

Specifications are subject to change. Please contact Nel Hydrogen for solutions to best fit your needs.

[1] Dependent on configuration and operating conditions.
[2] Consult Nel Hydrogen Applications Engineering Department for proper installation guidelines.

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MADE IN USA

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