

ML SERIES MULTI-LITER HYDROGEN GENERATOR



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WHY GAS GENERATORS

Gas generators offer a safe, convenient and cost-effective alternative to gas cylinders and dewars. A VICI DBS® generator provides you with a dependable, easy to use and on-demand supply of ultra high-purity gas.



UNIVERSAL BENEFITS

- Eliminates dangerous high-pressure cylinders helping to keep your employees safer
- Removes the logistics, inconvenience, downtime, and costs of a cylinder system
- Flow capacity and purity to match your specific instrument demands
- Easy to install, operate and maintain
- Minimal maintenance - low cost of ownership
- Improve your workflow and productivity
- Superior gas purification
- Install directly in the laboratory



FEATURES

- **MODULAR DESIGN** – additional individual cell stacks can be installed for future expansion
- **MODULAR OPERATION** – should one cell stack fail, the generator will continue to operate
- **MOBILE** – integrated wheels allow for flexible installation
- **HIGH PRESSURE** – up to 20 bar for high pressure applications
- **COMPACT DESIGN** – small footprint limiting the use of valuable space
- **MINIMAL INSTALLATION** – low cost start-up
- **MINIMAL MAINTENANCE** – low ongoing running cost
- **SAFE** – minimal hydrogen storage, automated shut-down systems
- **OPERATION** – innovative control system with intuitive and self-explanatory user interface



READY FOR THE FUTURE

- **INCREASE H₂ PRODUCTION AT ANY TIME** – unique to the ML Series Multi-liter Hydrogen Generator, the core design is based around a modular system. Up to three additional electrolyser cell stacks can easily be installed increasing the flow rate for your increasing demand.
- **MULTIPLE OPERATING MODES** – The ML Series can operate in three modes: pressure control, flow control and performance control.



IMPROVE SAFETY

Gas is produced on demand, which allows for the safe use of the hydrogen generator when cylinders are prohibited or regarded as potentially dangerous. Innovative, easy to use software control and full alarm capability (including for hydrogen leaks) gives the user full control of the gas supply.



INCREASE EFFICIENCY

A constant gas supply with guaranteed purity eliminates interruptions of analysis to change cylinders and reduces the amount of instrument re-calibration required.



ENHANCE PERFORMANCE

Gas generators can be installed in the lab close to the instrument, eliminating the need for long gas lines from external cylinder supplies. A constant guaranteed high purity gas supply improves stability and ensures greater reproducibility of results.



RETURN ON INVESTMENT

The payback period can be as short as 6 to 12 months.



▶ TRUSTWORTHY TECHNOLOGY

VICI DBS is a leading innovator and manufacturer of high purity gas systems for analytical laboratories. Generators are specifically designed to exceed the stringent gas requirements for all the leading GC and LC/MS instrument manufacturers.

▶ ISO 9001:2015 CERTIFIED

Operating from our ISO 9001:2015 accredited gas generator manufacturing center in Italy, every VICI DBS product is designed and tested to ensure compliance with the relevant safety standards. All generators meet and exceed the requirements for CE, FCC, and MET (CSA and UL compliant).

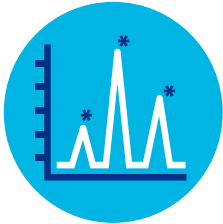
▶ PATENTED TECHNOLOGY

Utilizing VICI DBS's range of patented proprietary technologies, there are 12,000 systems installed worldwide. These technologies offer unique performance benefits, including guaranteed ultra-high purity gas, silent operation, minimal moving parts, and minimal operator attention.

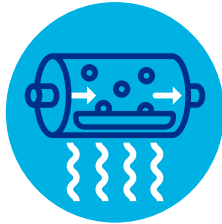


APPLICATIONS

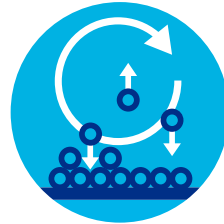
The ML Series Multi-liter Hydrogen Generator - the latest gas generator from VICI DBS. With flow rates from 4 to 18 L/min, purity up to 99.9995% and pressure up to 20 bar, the ML Series is suitable for multiple applications. With over 20 years of proven PEM technology the ML Series guarantees a safe, dependable supply of high purity gas on-demand.



CHROMATOGRAPHY



CHEMICAL VAPOR DEPOSITION (CVD)



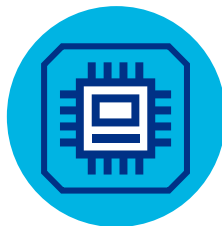
ATOMIC LAYER DEPOSITION (ALD)



POWER TO GAS



BALLOON FILLING



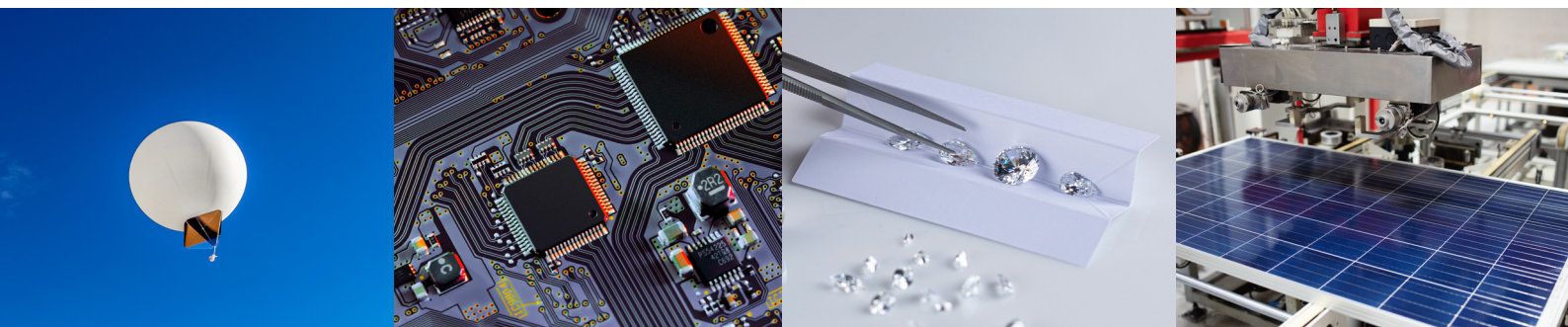
ELECTRONICS MANUFACTURING



METALLURGICAL INDUSTRY



HYDROGENATION



TYPICAL APPLICATIONS INCLUDE:

GC carrier gas | GC/MS carrier gas | GC fuel gas | Plasma cleaning instrument | Synthetic diamonds | Weather balloons | Laboratory instrumentation | Pilot plants | Manufacturing hydrogenation | Hydrogenation for research | LED displays | Thin layer deposition | Solar panel manufacturing | Fueling fuel cells | Metal hydride storage | Biogas | Welding | Annealing | Heat treatment

Proprietary 100% titanium, multi-layer PEM (proton exchange membrane) electrolyser (not visible)

Sensors and an innovative software control provides unrivaled safety during the complete process

Unique gas liquid separator removes bulk water from the hydrogen stream

State of the art graphic interface

Easy to maneuver for multi-use applications

Modular cell design allows for easy expansion

Heatless dryer ensures the production of high purity hydrogen



HYDROGEN PRODUCTION MADE SAFE

- MINIMAL STORAGE
- AUTOMATIC SHUT-OFF – internal and external hydrogen leaks, over pressure and low water
- EMERGENCY STOP – high visibility stop button
- FPGA SAFETY CONTROL
- CONTINUOUS MEASUREMENT – of hydrogen in the oxygen stream
- WATER FLOW CHECKS
- AMBIENT HYDROGEN MEASUREMENT

MODELS & SPECS	HV 4.5	HV 9	HV 13.5	HV 18
Flow SLM (@25°C/barg)	4.5 (w/o PSA 4.75)	9 (w/o PSA 9.5)	13.5 (w/o PSA 14.25)	18 (w/o PSA 19.0)
Purity	6.5 /+99.99995% with PSA; 5.5 / 99.9995% without PSA; N2 < 1ppm			
Dew Point	-78°C (-108.4°F) with PPE; -30°C (-22°F without PPE)			
Outlet pressure barg (psig)	1 to 20 (15 to 290)			
Technology	PEM (Proton Exchange Membrane) - 100% Titanium cell			
Efficiency (energy expended per volume based on 25°C, 1.0 barg)	< 5.9 kWh/m ³ (< 5.6 kWh/m ³ without PSA)			
Drying System	Gas cooling + Pressure Swing Adsorption			
Deionized Water Quality	Minimum < 1 µS/cm @25°C - 1 MΩ-cm@25°C - ASTM II Recommended < 0.2 µS/cm @25°C - 5 MΩ-cm @25°C - ASTM II			
Water Supply	External by integrated pump or directly on a water circuit (0.5 to 4.0 barg)			
Water consumption (L/h) ≤ 0.5/module	≤ 0.5	≤ 1	≤ 1.5	≤ 2
Security	<ul style="list-style-type: none"> • Automatic shutdown - internal/external hydrogen leaks, overpressure and low water emergency stop • Emergency stop • Continuous measurement of hydrogen concentration in oxygen • Water flow checks • Oxygen monitoring (enrichment) 			
Display	7" LCD touchscreen with operating parameters, system status, safety alarms and errors			
LED Indicators	Power on/off			
Interface	<ul style="list-style-type: none"> • Ethernet • External IO's 			
Electrical Supply	3 x 400 V 50/60 Hz +/- 10%			
Power Consumption (kW)	1.7	3.3	4.8	6.4
Heat load from system (kW) ≤ 0.75/module	≤ 0.75	≤ 1.5	≤ 2.25	≤ 3
H2 stored in the system	Stored H2: < 1.0 L at max. 24 barg			
Dimensions mm (inches)	496W x 846H x 880D (19.5W x 33.3H x 34.6D)			
Weight kg (lbs) Cpl. Generator	109 (240)	136 (300)	163 (360)	190 (419)
Weight kg (lbs) 1 Cell Module	27 (60)			
Operating Temp °C (°F)	10 to 35 (50 to 95)			
Outlet Connection H2	1/8" Compression (Swagelok)			
Inlet Connection DI Water	1/4" Push in			
Certification	CE			
IP Rating	IP 20			
Noise dB(A)	< 72			
Outlet Connection H2 Venting	1/4" Compression (Swagelok)			

PART NO.**DB-HV4.5-EU****DESCRIPTION**

Hydrogen Generator 4.5 L/min

DB-HV4.5-P-EU

Hydrogen Generator 4.5 L/min, with water pump

DB-HV4.5-D-EU

Hydrogen Generator 4.5 L/min, with dryer

DB-HV4.5-DP-EU

Hydrogen Generator 4.5 L/min, with dryer and pump

DB-HV9-EU

Hydrogen Generator 9 L/min

DB-HV9-P-EU

Hydrogen Generator 9 L/min, with water pump

DB-HV9-D-EU

Hydrogen Generator 9 L/min, with dryer

DB-HV9-DP-EU

Hydrogen Generator 4.5 L/min, with dryer and pump

DB-HV13.5-EU

Hydrogen Generator 13.5 L/min

DB-HV13.5-P-EU

Hydrogen Generator 13.5 L/min, with water pump

DB-HV13.5-D-EU

Hydrogen Generator 13.5 L/min, with dryer

DB-HV13.5-DP-EU

Hydrogen Generator 13.5 L/min, with dryer and pump

DB-HV18-EU

Hydrogen Generator 18 L/min

DB-HV18-P-EU

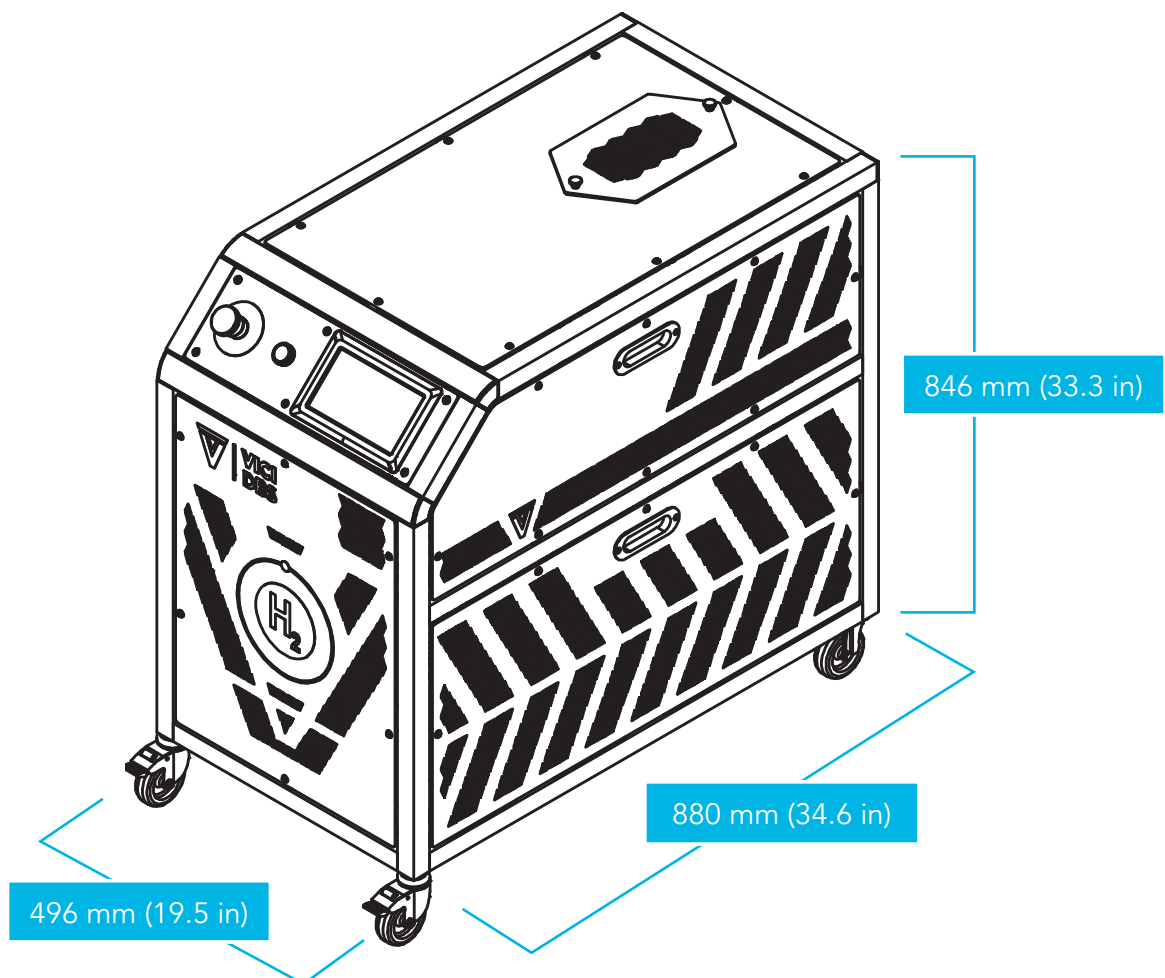
Hydrogen Generator 18 L/min, with water pump

DB-HV18-D-EU

Hydrogen Generator 18 L/min, with dryer

DB-HV18-DP-EU

Hydrogen Generator 18 L/min, with dryer and pump



YOUR DIRECT CONTACT:



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