

Helbio Hydrogen Generators



20-300 m³/h hydrogen production

Fueled by • **Natural gas**
• **Biogas**
• **L.P.G**

HHG series

Helbio HHG series

"Ready to Use" Hydrogen Production units

The Helbio small scale industrial hydrogen generators are designed to meet demanding requirements of hydrogen supply, using fuels such as Natural Gas, L.P.G or Biogas.

The system offers clean, quiet and efficient hydrogen generation under continuous operation with long service intervals.

The standard systems HHG-20, -50, -100 and 300 generate nominally 20, 50, 100 and 300 Nm³/h of H₂ respectively.

Systems optimized for customer needs and/or higher capacities can be considered upon request.

Hydrogen purity ranges from 99.9% to 99.999%, upon customer request.

Natural gas can be obtained from the existing network. Biogas can originate from various sources such as waste water treatment plants, farms, landfills or organic waste from industry and/or households.



Technical characteristics:

- Steam reforming
- Flameless catalytic combustion of PSA off gas with reformer
- No steam export
- Adjustable Hydrogen purity
- Remote & integrated control
- Easy installation
- Compact design
- Designed for 20 years life and 3 years service intervals

Applications:

- Industrial processes requiring Hydrogen
- Automobile Refueling Stations
- Power production via Fuel Cells

Helbio HHG series

System overview

Helbio's hydrogen generators are composed of four primary subsystems:

- The Fuel pretreatment unit which removes fuel impurities
- The Fuel Processor which converts the fuel into a hydrogen-rich stream
- The Pressure Swing Adsorption unit which purifies the hydrogen outlet to the desired level.



FUEL CLEANUP:

A series of traps removes the contaminants such as sulfur, ammonia, halides, that fuel typically contains and produces a clean fuel stream. The traps operate at ambient temperature, thus they do not require any energy input.

FUEL PROCESSOR :

The pretreated fuel is processed in a two step reactor configuration utilizing the proprietary and patented concept of the Heat -Integrated Wall Reactor for rapid heat exchange (HIWAR).

PSA:

The Pressure Swing Adsorption (PSA) system is the industry standard to purify hydrogen streams to the desired level. The PSA is a process used for separation of gas species from a gas mixture.

H₂

•The control system:

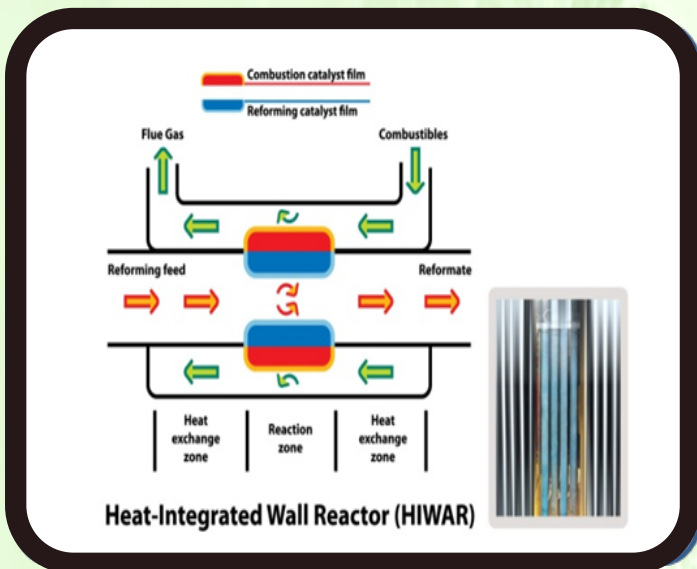
The units are highly automated with industrial grade PLC control systems and can operate autonomously and unattended. The smart control ensures smooth and fail- safe operation. Remote monitoring and control is included.

Helbio HHG series

Technology advantages

- Highly compact units- Transportable by truck
- Reformer size reduced 40-fold compared to conventional systems
- Easy on-site installation
- High efficiency- High degree of heat integration
- Enhanced safety- No flames

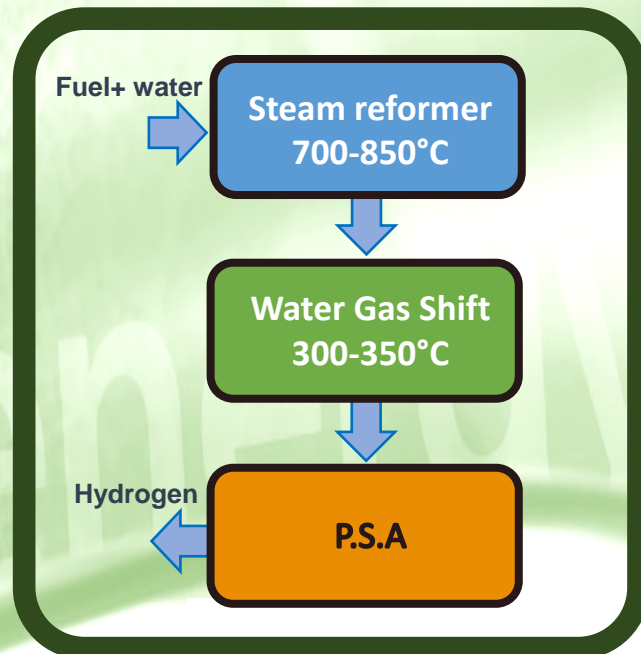
HIWAR Characteristics



- Heat exchanger type reactor reduces dead volume and heat transfer resistance
- Heat is produced very close to where the demand is located
- Very efficient heat transfer through the metallic wall (low resistance)
- Required amount of reforming catalyst, is significant lower than in a typical fixed bed reactor
- Very compact reactor more than 40 times smaller than conventional reformer

Process:

The fuel stream is mixed with water and fed to the reforming reactor that produces most of the H_2 . A large portion of the hydrogen comes from the water, i.e. water acts as a fuel in this process! The heat required for the process is produced by catalytic combustion of a fraction of the fuel, eliminating open flames. The CO contained in reformer outlet is removed in the Water-Gas-Shift (WGS) reactors where CO reacts with water to produce additional hydrogen and CO_2 . A Pressure Swing Absorption unit purifies Hydrogen to the desired level.



Helbio HHG series

System Characteristics

GENERAL:

Helbio hydrogen generation systems are designed for outdoor placement and to withstand severe environmental conditions. Most connections and peripherals are included in the main cabinets to assure easy and quick installation.

STANDARDS & DIRECTIVES:

System design and construction complies with all relevant international standards and E.C. directives (97/23 EC, 94/9 EC, 2004/108 EC, EN13445). CE marking is available upon customer request.

Specifications		HHG-20	HHG-50	HHG-100	HHG-300
Hydrogen Production (Nm ³ /h)		20	50	100	300
Fuel consumption :	Propane ¹ (Kg/h)	6.9	17.3	34.6	103.8
	N.G. ² (Nm ³ /h)	9.3	23.2	46.4	139.2
	Biogas ³ (Nm ³ /h)	15.7	39	78	234
PSA recovery ⁴		80%	79%	79%	79%
Hydrogen supply pressure ⁵		6-7	6-7	6-7	6-7
Input Voltage		230V	230V	400V 3ph	400V 3ph
Power consumption (KW)		1	3	5	12
Dimensions LxWxH (m)		5*2.4*2.5	6*2.5*2.5	2pcs 6*2.5*2.5	2pcs 6*2.5*2.5

1: Commercial propane > 95% C₃

2: Methane content: 95%

3: Methane content: 65%

4: Depending also on required H₂ purity

5: Can vary upon request

For more info visit
www.helbio.com

NOTE: HYDROGEN PURITY CAN REACH FROM 99,9% TO 99,999% UPON CUSTOMER REQUEST

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