



High Pressure Alkaline Electrolysers For Large-Scale Hydrogen Production



Introduction

HydrogenPro supplies high quality hydrogen plants based on water electrolysis. The core of our systems is the alkaline electrolyser technology by our partner TianJin Hydrogen Equipment (THE). THE has been pioneering the electrolyser market with their high-pressure systems for the past two decades: world leader in terms of performance and capacity.

Our experienced engineering team designs the plants according to local standards and customer's requirements. The production is ISO 9001 certified. All our products are produced with maximum focus on safety, reliability and long lifetime with minimum cost.

Since 1994 more than 300 plants have been supplied worldwide. Our electrolysers are being used in a variety of applications, e.g. chemical, electronic and metallurgical as well as float glass, optical fibre and oil and grease industry. Furthermore, our electrolysers have also been supplied to gas companies as well as thermal and nuclear power plants.

Electrolyser cell stack with pipes coloured according to the type of fluid; see next page for the corresponding gas separator skid.



Technical information

High pressure alkaline electrolysis – your preferred choice

Our high pressure alkaline electrolysis system is compact by design, well proven and the most energy efficient on the market. The pressurized system reduces investment and operation costs. Hydrogen and oxygen are produced under pressure. Therefore, compressors are not required for most industrial applications, thus saving electricity and reducing maintenance.

Low power consumption and operating cost

One very important factor to consider when investing in an electrolyser plant is the operating cost. The main contributions are power consumption and cell stack replacement costs. The power consumption in all our pressurised electrolysers are stable during the life time of the units. For our largest units the DC power consumption is as low as 3,8 to 4,4 kWh/Nm³ for 20% to 100% load respectively @30 bar pressure for both Hydrogen and Oxygen. The electrolyser plant is designed to last for many years. The only component that needs replacement is the cell stack which is designed to last minimum 10 years.

Gas separation skid with lye pumps and coolers.



Modular and compact design – easy installation

The electrolyzers are modular, very compact by design and require little floor space. This reduces the civil work prior to installation of the electrolyser modules.

Medium and large capacity units:

Medium and large capacities are typically between 150 and 1000 Nm³/h. For indoor installation, the electrolyser cell stack and the gas separation skid are supplied as two complete modules. On site, the piping that remains to be connected are the lye pipes and gas pipes only. In addition, feed water, cooling water and instrument air as well as nitrogen need to be connected to the gas separator skid.

Small capacity units:

If you require hydrogen gas in the range 10 to 200 Nm³/h, we can also offer the electrolyser plant as one compact unit, either in a cabinet or in a container.

Remote operation

Plants are normally operated in automatic mode. The load normally varies from 25% to 100% output. All our plants can be operated remotely. This makes operation simple and allows for unattended operation.

Ultra-quick response

Our pressurized electrolyzers are ideal for renewable energy applications with intermittent power supply. After a stop, ramp-up in warm state takes 1 second.

Gas purity

Hydrogen and oxygen exit the electrolyser at the same pressure: up to 30 bar for the large units and up to 50 bar for the smaller units. The purity of the gases is 99,9% and 99,5% respectively. If required gas purity up to 99,9999% can be achieved by installing a purifier.



Containerised solutions can be offered for hydrogen production capacities up to 200 Nm³/h.

Products

Our electrolyzers can be ordered at any capacity from 10 Nm³/h up to 1000 Nm³/h of hydrogen produced from a single cell stack. The modular design allows to install several cell stacks for production capacities exceeding 1000 Nm³/h.

Examples of units we supply:

Hydrogen production in Nm ³ /h (kg/h)	10 (0,9)	60 (5,4)	125 (11,3)	350 (31,5)	600 (54)	800 (72)	1000 (90)
Oxygen production in Nm ³ /h (kg/h)	5 (7,2)	30 (42,9)	62,5 (89,4)	175 (250,3)	300 (429)	400 (572)	500 (715)
Pressure without compressor in MPa (bar)	5,0 (50)	5,0 (50)	3,0 (30)	3,0 (30)	3,0 (30)	3,0 (30)	3,0 (30)
Power consumption (kWh/Nm ³ H ₂)	4,8	4,6	4,5	4,4	4,4	4,4	4,4
Approx floor space needed (m ²)	20	50	70	100	125	140	150
Approx height to ceiling (m)	4	5	5	6	7	8	8

Selected sizes of electrolyzers with floor space required for the installation. The pressure given is the maximum pressure of the gases exiting the electrolyser plant without installing compressors. Oxygen is produced at the same pressure as hydrogen, and can thus be used in most industrial applications without additional compressor. Values are given as DC power consumption.

To complete your electrolyser plant, we deliver:

- High voltage transformers
- Advanced AC/DC converters with best performance
- Feed water tanks in stainless steel – where nitrogen stripping can be included
- Lye mixing tanks in stainless steel – including lye mixing pumps
- Buffer tanks – all sizes
- Oxygen purifiers – with up to 99,9999 % pure oxygen
- Hydrogen purifiers – with up to 99,9999 % pure hydrogen
- Water treatment systems – for feed water supply
- Gas detectors and analysers

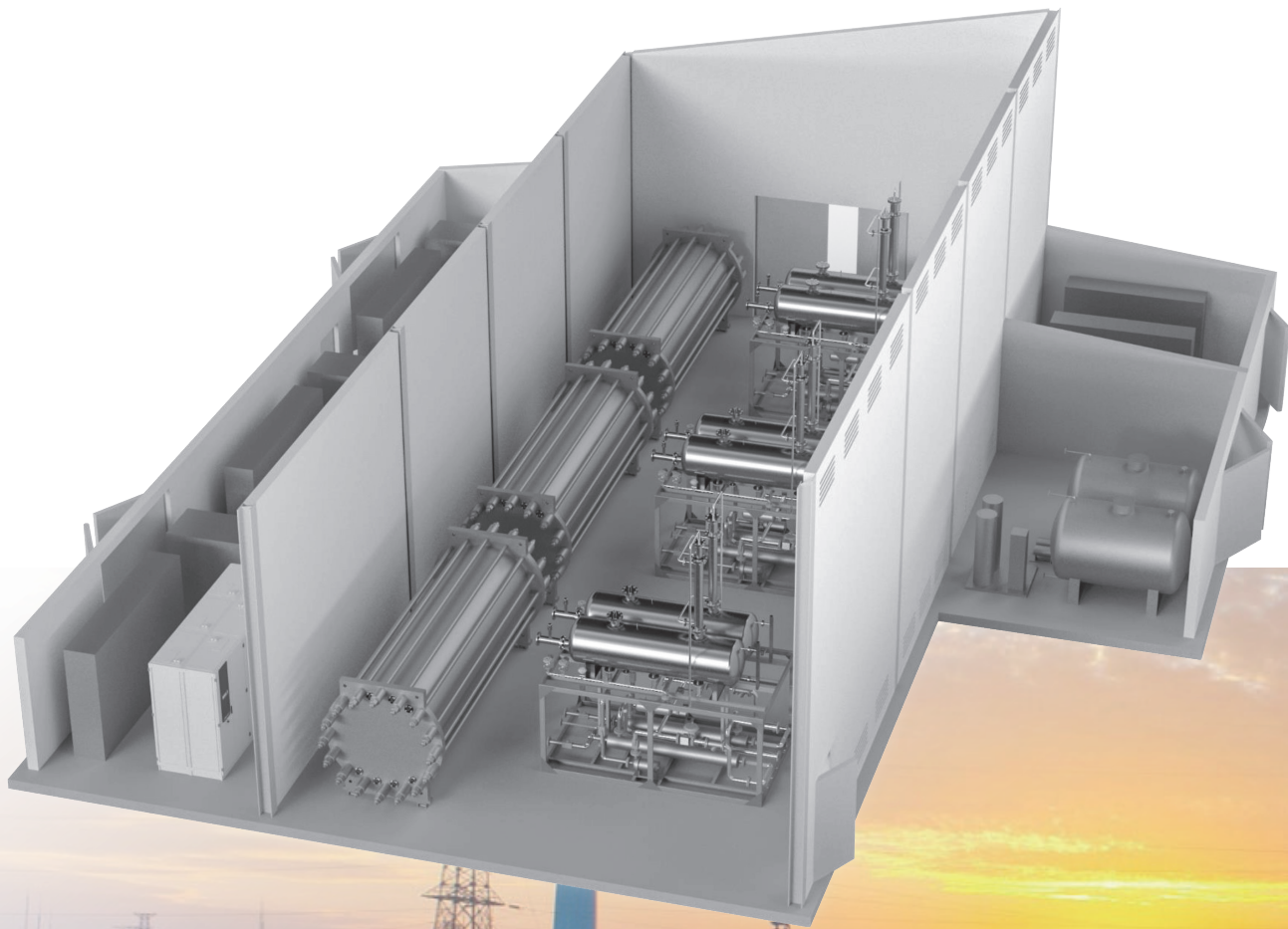
HydrogenPro - your solution provider:

- We supply turn-key solutions, including engineering, plant erection and commissioning.
- We also offer service agreements and online support

Outstanding performance for megaplants: 1000 Nm³/h electrolyser

For large scale hydrogen plants, such as renewable energy projects, e.g. power to fuel, we offer the largest unit on the market with outstanding performance. The hourly hydrogen production capacity of this cell stack is 1000 Nm³/h at a pressure of 30 bar. The power consumption is as low as 3,8 to 4,4 kWh/Nm³ for 20% to 100% load respectively. Due to the compact design, this unit is ideal for large scale hydrogen production. As for all other electrolysers in our portfolio, oxygen is produced under pressure and readily available for industrial applications.

Illustration of a compact mega-scale (10 MW) hydrogen plant arrangement.



What we offer

Best-in-class compact high pressure electrolyzers with the following advantages:

Low CAPEX

- No compressor needed
- Space efficient

Low OPEX

- Energy efficient
- Fully automated operation

Reliable

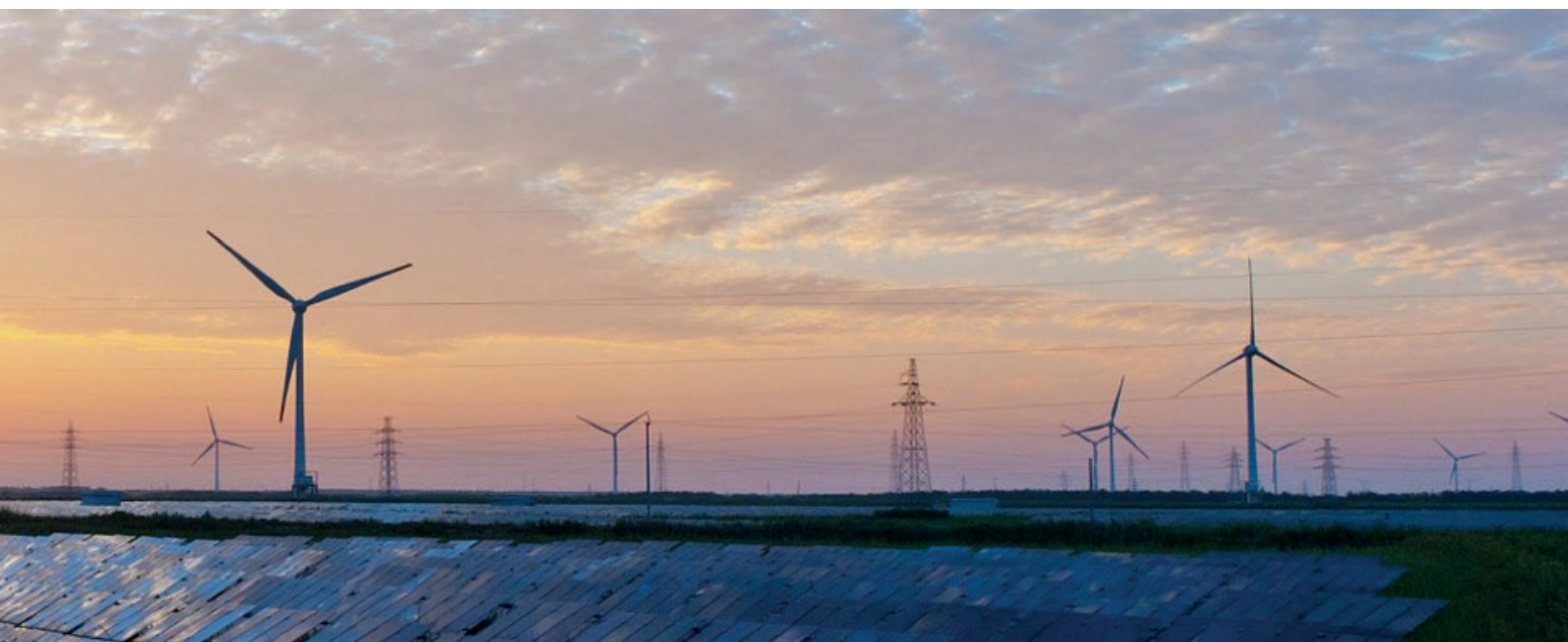
- No moving parts
- 24/7/365 operation

Renewables compatible

- Very quick response time to variable power input

Well-proven

- 400 units delivered since 1994





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