HyProvide™ A-Series

Modular electrolysis solutions that provide scalable, low-cost hydrogen using electricity from renewable sources

The HyProvide™ A-Series is the world’s only range of complete alkaline electrolysis units available in standardised, modular configurations that provide maximum flexibility and scalability.

HyProvide™ A-Series units can meet all your electrolysis needs – whether standalone or cluster-configured for MW-scale supplies of low-cost hydrogen.

You get >99.998% pure dry hydrogen at 35 bar, ideal for direct storage, further compression or immediate use as is.
Building blocks for commercial success

The HyProvide™ A-Series meets your every need for high-efficiency alkaline electrolysis. Just add water and electricity.

Designed specifically for applications that focus on the responsible use of renewable energy, modular MW-scale alkaline HyProvide™ A-Series units deliver the performance and high return on investment that help provide your operation with commercial success as well as environmental acceptability.

Each HyProvide™ A-Series unit is a complete electrolyser solution that includes everything you need – fully configured, pretested, and ready to install and power up.

Inexpensive to purchase, own and operate
- Standardised modular units keep CAPEX costs down
- Exceptional price/performance metrics, with very low OPEX costs due to high efficiency
- No significant site preparation needed – no ATEX requirements
- Pre-configured, pre-tested systems ensure inexpensive, rapid installation and commissioning
- Fully automated operation, with minimal manpower requirements
- Designed for >20-year service life, with excellent return on investment

Easy to service and maintain
- Comprehensive use of quality-tested, standardised components keeps service and maintenance costs to a minimum
- All key components are tray-mounted for easy access during service or replacement
- The stack is easy to disconnect and remove from the mounting rack for service. Changing the whole stack only takes 3 hours
- All components exposed to lye are nickel-coated to ensure long service life

How you benefit
- Proven, stable technology that provides you with a high return on investment
- Exceptional price/performance metrics
- High-volume, affordable storage of any kind of renewable energy
- Effective, reliable "building blocks" for a wide range of multi-energy solutions
- High uptime statistics, supported by advanced monitoring and control systems
- Power up/down in less than a second for effective grid balancing
- Provides effective basis for optimisation of the entire hydrogen value chain

There’s more information at greenhydrogen.dk, or contact our sales department at +45 7550 3500 or sales@greenhydrogen.dk
Modular opportunities

Each HyProvide™ A-series unit is a complete, modular electrolyser that includes everything you need, so you’re ready to begin operations fast.

Each unit is a small-footprint, self-contained module with its own controller. Any number of units can be connected in a cluster to supply multi-MW solutions. You scale up smoothly by simply adding more units to the cluster, or adding more clusters when you’re ready for more capacity.

This modular configuration makes it easy for operators to expand their hydrogen production setups as and when needed, and as market requirements change.

You can opt for HyProvide™ A-Series electrolysers as single units (ideal at a hydrogen refuelling station, for example) – or as multiple units to provide a MW-scale source of hydrogen for larger-scale industrial uses.

Modular, compact and complete

- Single HyProvide™ unit with 2 m² footprint produces up to 200 kg hydrogen daily
- Delivered as 30/60/90 Nm³ hydrogen/hour (2.7/5.4/8.1 kg hydrogen/hour modules – pre-tested and ready to switch on
- Stand-alone units for installation inside buildings, or mounted in standard 20 or 40-ft containers
- Easy to connect multiple HyProvide™ modules in a cluster to provide large-scale hydrogen requirements
- Inverter, power electronics and HyProManager™ monitoring and control system are included as standard
- Control system, dryer and de-oxygenation unit all included as standard
- Cables, pipes and hoses all connect at the top, for easy installation

The HyProManager™ software advantage

- Advanced monitoring and control system provides automatic operation with minimal manpower requirements.
- Easy to manage, monitor and control HyProvide™ units individually or in clusters
- Easy integration into SCADA control systems (on-site or remote) and grid balancing/grid management systems
- Provides automated redundancy and load balancing
- Predicts requirements to ensure planned, preventive service and maintenance
- Remote monitoring enables rapid system diagnostics and problem-solving, with big savings to follow

20 HyProvide™ A90 units
in a production plant, including water treatment, water pressurisation and main controller. Provides 1800 Nm³ hydrogen/hour (8.6 MW/162 kg hydrogen/hour).

Containerised HyProvide™ A90 – for use wherever a reliable supply of hydrogen is required.
## Overview of HyProvide™ A-Series specifications

<table>
<thead>
<tr>
<th>Electrolyser unit</th>
<th>A30</th>
<th>A60</th>
<th>A90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen production rate (Nm³/hour</td>
<td>kg/hour)</td>
<td>30</td>
<td>2.7</td>
</tr>
<tr>
<td>Hydrogen pressure (bar)</td>
<td></td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Hydrogen purity (%)</td>
<td>&gt;99.998</td>
<td>&gt;99.998</td>
<td>&gt;99.998</td>
</tr>
<tr>
<td>Hydrogen dew point (°C)</td>
<td>-70</td>
<td>-70</td>
<td>-70</td>
</tr>
<tr>
<td>Oxygen purity (%)</td>
<td>&gt;99</td>
<td>&gt;99</td>
<td>&gt;99</td>
</tr>
<tr>
<td>Maximum stack power consumption (kW)</td>
<td>125</td>
<td>250</td>
<td>390</td>
</tr>
<tr>
<td>Stack voltage (DC)</td>
<td>250</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>Stack current at 100% load (A)</td>
<td>1200</td>
<td>1200</td>
<td>1800</td>
</tr>
</tbody>
</table>

### Stack at 100% load:
- Power consumption (kW/Nm³): 4.17 (A30), 4.17 (A60), 4.33 (A90)
- Efficiency HHV (%): 84.97 (A30), 84.97 (A60), 81.8 (A90)

### Stack at 50% load:
- Power consumption (kW/Nm³): 3.91 (A30), 3.91 (A60), 4.05 (A90)
- Efficiency HHV (%): 90.5 (A30), 90.5 (A60), 87.4 (A90)

### Stack at 25% load:
- Power consumption (kW/Nm³): 3.77 (A30), 3.77 (A60), 3.84 (A90)
- Efficiency HHV (%): 94.0 (A30), 94.0 (A60), 92.0 (A90)

### Total system at 100% load:
- Power consumption (kW/Nm³): 4.63 (A30), 4.63 (A60), 4.81 (A90)
- Energy consumption (kWh/kg hydrogen): 51.44 (A30), 51.44 (A60), 53.66 (A90)
- Efficiency HHV (%): 76.5 (A30), 76.5 (A60), 73.6 (A90)

### Electrical interface
- 3 phase 400 V +/- 10 %, 50-60 Hz

### Water intake (litres/Nm³)
- 0.9

### Water quality (µS/cm)
- <5

### Liquid cooling requirements (kW)
- 40

### Communication interface
- Ethernet/Can-bus

### Control software
- HyProManager™

### Installation
- Indoors or container

### Ambient humidity skid frame (% relative humidity, non-condensing)
- 0–90

### Ambient temperature skid frame (°C)
- +5–+40

### Ambient temperature container (°C)
- -20–+40

### Skid frame measurements wxdxh (mm)
- 1800 x 1100 x 2300

### Skid frame weight (kg)
- <3500

### Expected stack service life (years)
- +10


Measurements carried out in GreenHydrogen lab.

### About GreenHydrogen

Founded in 2007, GreenHydrogen provides a proven, low-cost technology platform that serves as a reliable basis for significant commercial opportunities in the growing fossil-free economy. Producing hydrogen using renewable energy, in a wide range of innovative, decentralised setups, makes it possible to produce and consume energy locally.

Highly competitive electrolysis solutions from GreenHydrogen make it easy to exploit hydrogen as a tradeable commodity, and make the entire hydrogen value chain more efficient, more reliable and more affordable.