

# GREENHYDROGEN



## 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.



Transport



Energy storage



Power-to-X



Larger industry

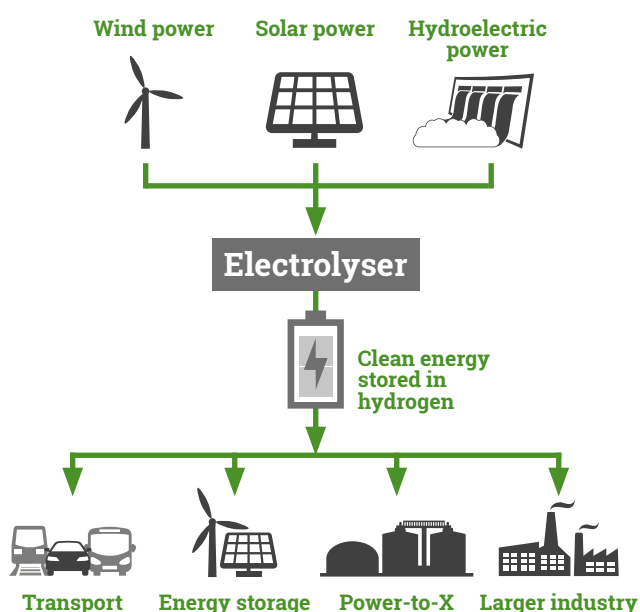
# Building blocks for commercial success

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.



## 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

### 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

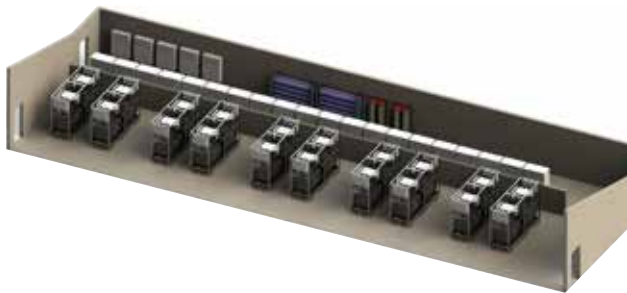
- Comprehensive use of quality-tested, standardised components keeps service and maintenance costs to a minimum
- All key components are tray-mounted for easy access during service or replacement
- The stack is easy to disconnect and remove from the mounting rack for service. Changing the whole stack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

**There's more information at [greenhydrogen.dk](https://greenhydrogen.dk),  
or contact our sales department at +45 7550 3500 or [sales@greenhydrogen.dk](mailto: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.



*20 HyProvide™ A90 units in a production plant, including water treatment, water pressurisation and main controller. Provides 1800 Nm<sup>3</sup> hydrogen/hour (8.6 MW/162 kg hydrogen/hour).*

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.



*Containerised HyProvide™ A90 – for use wherever a reliable supply of hydrogen is required.*

### Modular, compact and complete

- Single HyProvide™ unit with 2 m<sup>2</sup> footprint produces up to 200 kg hydrogen daily
- Delivered as 30/60/90 Nm<sup>3</sup> 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

# Overview of HyProvide™ A-Series specifications

| Electrolyser unit   | A30                              | A60                              | A90                              |
|---|----------------------------------|----------------------------------|----------------------------------|
| Hydrogen production rate (Nm <sup>3</sup> /hour   kg/hour)        | 30   2.7                         | 60   5.4                         | 90   8.1                         |
| Hydrogen pressure (bar)   | 35                               | 35                               | 35                               |
| Hydrogen purity (%)   | >99.998                          | >99.998                          | >99.998                          |
| Hydrogen dew point (°C)   | -70                              | -70                              | -70                              |
| Oxygen purity (%)   | >99                              | >99                              | >99                              |
| Maximum stack power consumption (kW)                              | 125                              | 250                              | 390                              |
| Stack voltage (DC)  | 250                              | 250                              | 250                              |
| Stack current at 100% load (A)                                    | 1200                             | 1200                             | 1800                             |
| <b>Stack at 100% load:</b>  |                                  |                                  |                                  |
| Power consumption (kW/Nm <sup>3</sup> )                           | 4.17                             | 4.17                             | 4.33                             |
| Efficiency HHV (%)  | 84.97                            | 84.97                            | 81.8                             |
| <b>Stack at 50% load:</b>   |                                  |                                  |                                  |
| Power consumption (kW/Nm <sup>3</sup> )                           | 3.91                             | 3.91                             | 4.05                             |
| Efficiency HHV (%)  | 90.5                             | 90.5                             | 87.4                             |
| <b>Stack at 25% load:</b>   |                                  |                                  |                                  |
| Power consumption (kW/Nm <sup>3</sup> )                           | 3.77                             | 3.77                             | 3.84                             |
| Efficiency HHV (%)  | 94.0                             | 94.0                             | 92.0                             |
| <b>Total system at 100% load:</b>                                 |                                  |                                  |                                  |
| Power consumption (kW/Nm <sup>3</sup> )                           | 4.63                             | 4.63                             | 4.81                             |
| Energy consumption (kWh/kg hydrogen)                              | 51.44                            | 51.44                            | 53.66                            |
| Efficiency HHV (%)  | 76.5                             | 76.5                             | 73.6                             |
| Electrical interface  | 3 phase 400 V +/- 10 %, 50-60 Hz | 3 phase 400 V +/- 10 %, 50-60 Hz | 3 phase 400 V +/- 10 %, 50-60 Hz |
| Water intake (litres/Nm <sup>3</sup> )                            | 0.9                              | 0.9                              | 0.9                              |
| Water quality (µS/cm)   | <5                               | <5                               | <5                               |
| Liquid cooling requirements (kW)                                  | 40                               | 80                               | 120                              |
| Communication interface   | Ethernet/Can-bus                 | Ethernet/Can-bus                 | Ethernet/Can-bus                 |
| Control software  | HyProManager™                    | HyProManager™                    | HyProManager™                    |
| Installation  | Indoors or container             | Indoors or container             | Indoors or container             |
| Ambient humidity skid frame (% relative humidity, non-condensing) | 0–90                             | 0–90                             | 0–90                             |
| Ambient temperature skid frame (°C)                               | +5–+40                           | +5–+40                           | +5–+40                           |
| Ambient temperature container (°C)                                | -20–+40                          | -20–+40                          | -20–+40                          |
| Skid frame measurements wxdxh (mm)                                | 1800 x 1100 x 2300               | 1800 x 1100 x 2300               | 1800 x 1100 x 2300               |
| Skid frame weight (kg)  | <3400                            | <3500                            | <3500                            |
| Expected stack service life (years)                               | +10                              | +10                              | +10                              |

All configurations are CE-approved and comply with: Hydrogen generators ISO 22734-1, EMC directive (2004/108/EC), Low voltage directive (2006/95 EC), Machine directive (2006/42/EC), PED directive (2014/68/EC)

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.

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