

Solar Hydrogen Extension

Mobile Unit for Solar Hydrogen Production

The Solar Hydrogen Extension generates hydrogen from solar power. A software program helps users to learn about energy flux and system efficiency, making it possible to implement interesting projects dealing with autarkic energy supply.



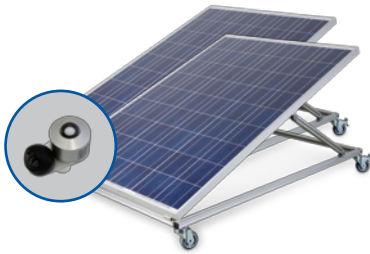
Product Features

- » PV systems for AC loads up to 700 W
- » Electrolyzer and PV system can be used separately
- » PC software for system control and data acquisition is included
- » Extensive instruction and experimentation material
- » Mobile system components with rollers
- » Remote monitoring via LAN network is possible

System Design

Solar Hydrogen Extension

The Solar Hydrogen Extension is a modular system. Connecting cables and quick-release couplings allow easy set-up and take-down.



Solar Module Unit

- » 2 x 200 Wp polycrystalline solar module
- » Adjustable angle of inclination

Optional: PV Sensor Kit

- » Temperature sensors
- » Irradiation sensors
- » Compass for module alignment



System Technology Unit

- » Suitable for loads up to 700 W
- » Ethernet port for PC control and network connection
- » Includes power electronics, measuring technology and batteries
- » Optimized for the supply of the electrolyzer



Hydrogen Generator

- » Production capacity of 30 or 60 sl/h
- » Suitable for continuous operation
- » Interface for PC control

Functional Principle



Solar Module



Load Regulator



Battery



Power Electronics



Hydrogen Generator



H₂ Storages*

The direct current generated by the solar modules charges the system batteries by means of a load regulator. The power electronics, including an inverter and a DC converter, provide the user with 12 V DC and 230 V AC.

The system control provides for optimal operation of the hydrogen generator. It does not start operating until the battery has reached a minimum charge. This ensures uninterrupted operation of the system in case of inconsistent sunshine.

The hydrogen is stored in metal hydride canisters, which are also used in training and fuel cell systems from Heliocentris.

Possible Combinations



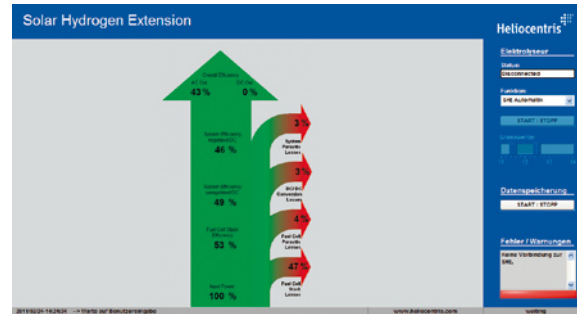
The Solar Hydrogen Extension can be combined with the following products: Instructor Training and Integration System, Nexa® Training and Integration System and FC-42 Evaluation Kit.

*not included in the scope of delivery

Software

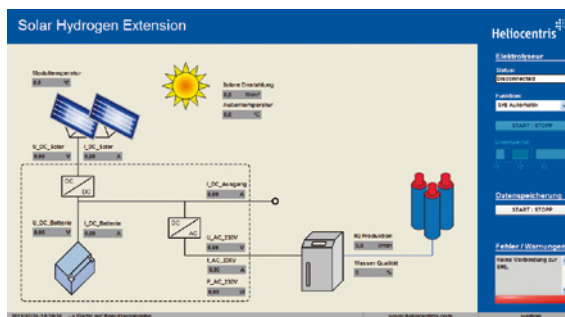
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The software is used to visualize data and control the system. Measurements at the system and component level are displayed and can easily be retrieved and exported for further processing. Also, the limit values for the battery regulation can be defined.



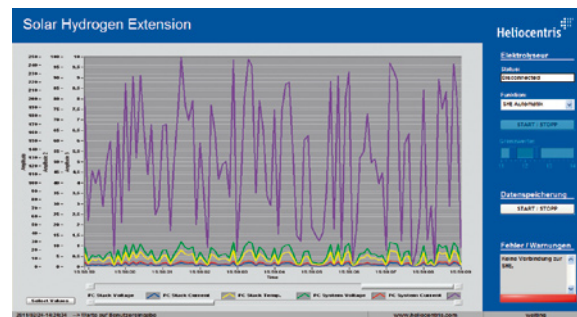
Efficiency Analysis

- » Overall system output balancing
- » System efficiency chain (Sankey diagram)



System Overview

- » Flow chart view
- » Voltage and current display for individual components



Time Curve

- » Graphic visualization of the measurements
- » Freely configurable measurements

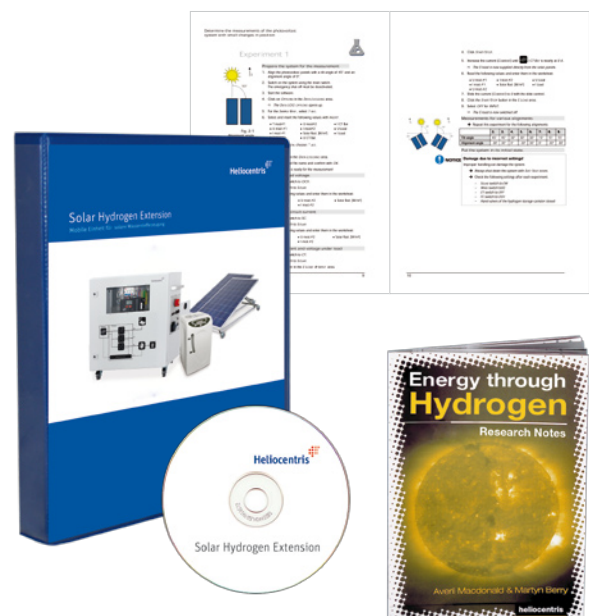
Supplementary Material

The supplementary material facilitates use of the system.

- » Detailed operating manual
- » Science book on hydrogen
- » Experiment Guide with:
 - Graphic display of experiment set-ups
 - Worksheets with questions and tasks
 - Solutions
- » CD-ROM with printable experiment sheets (PDF files)

Sample Experiments

- » Optimal alignment of solar modules
- » Determining the efficiency of the electrolyzer
- » Behavior of solar modules



Product Overview

Solar Hydrogen Extension



Solar Hydrogen Extension

- » System technology unit
- » 2 mobile solar module units
- » Hydrogen generator with interface (30 or 60 sl/h)
- » Monitoring and control software
- » Cable set

With 30 sl/h hydrogen generator
With 60 sl/h hydrogen generator

Item No. 811
Item No. 812

Accessories



PV Sensor Kit

- » Irradiation sensor
- » Temperature sensors
- » Compass

Item No. 821



Hydrogen Storage Canister

- » Low-pressure metal hydride canister
- » Capacity 760 NI
- » Quick coupling

Item No. 647

Technical Data

| System Technology Unit | |
|-----------------------------------|-----------------------------|
| Max. input current, photovoltaics | 30 A |
| System voltage, photovoltaics | 24 V DC |
| Max. output current 12 V DC | 2 A |
| Max. continuous output 230 V AC | 700 W |
| Momentary peak load | 1050 W (for 10 sec) |
| Output voltage frequency | 230 V, 50/60 Hz, True Sinus |

| Solar Module | |
|-----------------------|-----------------|
| Type | Polycrystalline |
| System voltage | 24 V DC |
| MPP output | 200 Wp |
| Efficiency | >13 % |
| Short circuit current | 8.5 A |
| MPP voltage | 24.95 V |

| Battery | |
|----------------|--|
| Type | 2 solar lead-acid batteries (12 V), maintenance-free |
| System voltage | 24 V DC |
| Capacity | 55 Ah |

| Hydrogen Generator | |
|------------------------------|--------------------------------------|
| Production capacity | 30 60 sl/h |
| Hydrogen purity | > 6.0 (99.9999 %) |
| Outlet pressure | 1.4 - 10.7 bar (selectable) |
| Required water quality | max. 2 µS/cm, deionized or distilled |
| Operating temperature | 15 °C to 40 °C |
| Input voltage | 120 or 240 V AC / 50-60 Hz |
| Max consumption (selectable) | 300 480 VA |
| Dimensions (W x D x H) | 230 x 35 mm |
| Weight (unfilled) | 20 kg |



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