Heliocentris

Fuel Cell Trainer

50 W Fuel Cell Training System

ACADEMIA OFFERING
TRAINING SOLUTIONS

The Heliocentris Fuel Cell Trainer is ideal for teaching basic engineering principles of fuel cell systems. Realistic and extensive experimental capabilities and an optimized instruction manual make it a comprehensive training system for both teachers and students.

- Durable 50 W proton exchange membrane (PEM) fuel cell, air-cooled, open cathode
- Data recording via USB interface
- Extensive measuring technology
- User-friendly LabVIEW based software
- Optimized and modern instruction material
- Integrated safety System
- Suitable for introductory and advanced classes

Fuel Cell Trainer

Fuel Cell Training System for teaching basic engineering principles

The Fuel Cell Trainer ideally covers the teaching requirements of universities and vocational schools, including predefined experiments and an extensive instructional manuals. It enables students and trainees to examine the design and functionality as well as the scientific principles behind a fuel cell system.

The training system is easy to operate by users of all skill levels. The automatic shut-off system ensures complete user safety.

Learning objectives of the Fuel Cell Trainer include:

- Structure and functionality of a fuel cell
- Thermodynamic and principles of electricity
- How to start-up and operate a fuel cell system
- The effect of influencing factors on the characteristic curve of a fuel cell
- Learning to evaluate stack & system efficiencies, losses & parasitic loads

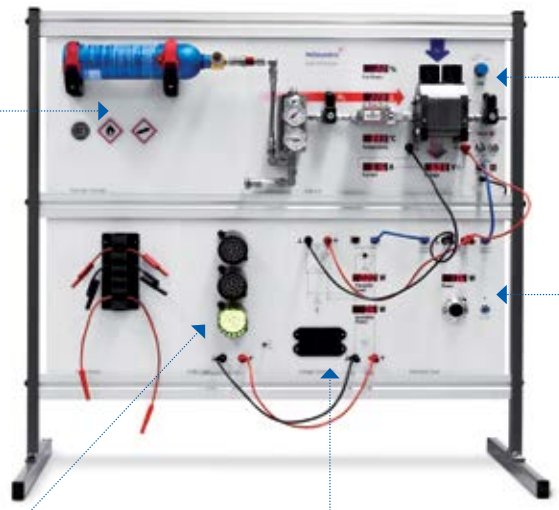
The system is suitable for use in labs, lectures and demonstrations in diverse fields of study:

- Mechanical Engineering
- Chemical Engineering
- Electrical Engineering
- Energy Engineering
- Process Engineering
- Automotive Engineering
- Renewable Energy and Environmental Technology

System Overview

H_2 Storage Module
The metal hydride canister with a two-stage pressure reducer provides save hydrogen supply to the 50 W fuel cell.

Accessory: Hydrogen Generator HG30
Easy production of high-purity hydrogen (99.9999 % vol), in order to refill the metal hydride canisters.

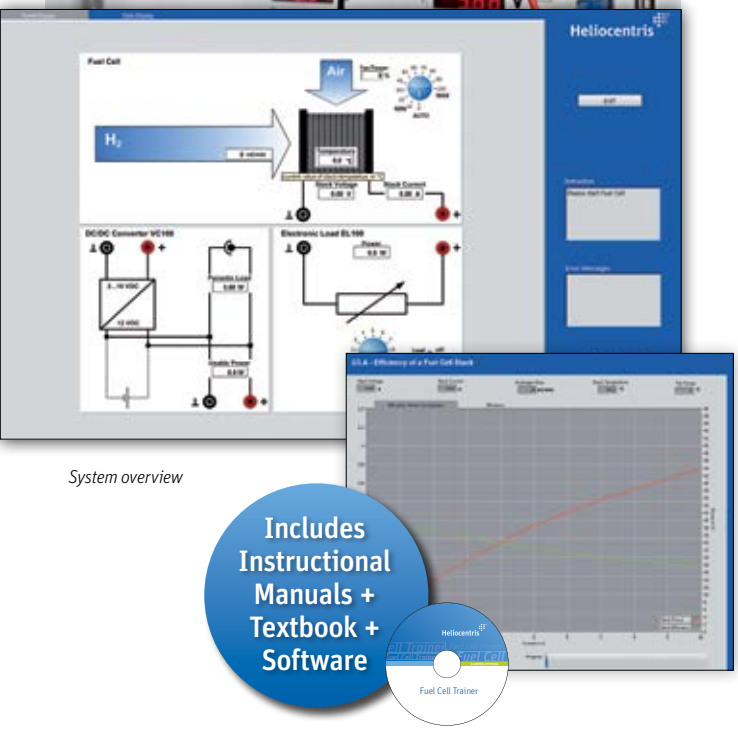


Fuel Cell Module
Includes a 50 W fuel cell, controller, hydrogen flow sensor, purge valve and an adjustable fan. Five LED displays are included for monitoring the temperature, current, voltage, H_2 & air supply.

Electronic Load Module
The electronic load allows the user to vary the current and examine its effects on the system. It can be controlled manually or via the software.

Traffic Light Module
The Traffic Light Module is a 12 V sample load with three settings.

DC/DC Converter Module
The module converts the unregulated output voltage of the fuel cell to 12 V DC enabling the autonomous power supply of a 12 V load. It includes LCD displays for measuring: load, parasitic losses and available power.



System overview

Software

The LabVIEW based software is designed to facilitate system control, data acquisition and graphical representation of the collected data. Key features include:

- A graphical representation of the physical system, ideal for group presentations and experiments
- Extensive data logging and graphing capabilities.
- Data acquisition: air supply, temperature, voltage, current and hydrogen supply
- Plotting of characteristic curves and efficiency curves
- Fully automated experiments and teacher-driven research possible

Fuel Cell Trainer

- Fuel cell module
- Electronic load module
- DC/DC converter modul
- Traffic light module
- H_2 storage module
- Instruction manual with experiment guide in ring binder
- Software + CD
- Textbook "Fuel Cell Systems Explained"

Art. no. 693*

Accessories: Hydrogen supply – 15 bar H_2 connection kit for supply from 200 bar cylinders

Pressure reducer for filling the hydrogen storage canister in the H_2 storage module

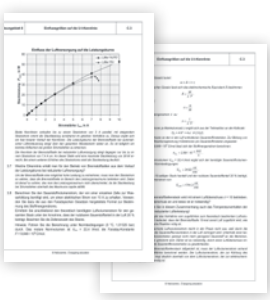
Art. no. 631

Instruction Material

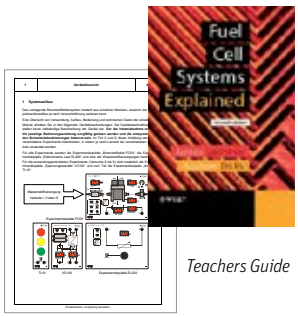
Includes a comprehensive instruction manual, experiment guide (teacher & student) and the popular textbook „Fuel Cell Systems Explained". It also includes a quick-start guide to make system set-up a breeze.

The experiment guide includes:

- Basic functions of a fuel cell system
- Characteristic curve of a fuel cell and its influencing factors
- Determination of the hydrogen current curve
- Efficiency of the fuel cell stack



Experiments



Teachers Guide

Fuel Cell Integration System

EASY TO INTEGRATE: Model cars, light systems, autonomous power supply

APPLICATION EXAMPLE

The Fuel Cell Integration System is ideal for projects at universities, institutes and vocational schools. It can be used in various application projects, such as a small power supply or range extender.

Key facts:

- A very stable system that is easy to operate
- Easy installation
- Software interface for data analysis
- Excellent quality and safety standards

Fuel Cell Integration System **Art. no. 611**

* Only available in combination with a hydrogen connection kit from Heliocentris.

Technical Data

Fuel Cell Trainer	
Dimensions (WxHxD)	910 x 840 x 460 mm
Weight	19 kg
Permissible ambient temperature during operation	+5 … +35°C
Language versions	German, English (other languages on request)
Anschlussstandards	DIN, CGA or BS
Netzanschlussweg	230 V (50 Hz), 115 V (60Hz)

Fuel Cell Module	
Rated output	40 W
Maximum output	approx. 50 W
No-load voltage	9 V
Current at rated output	8 A
Hydrogen consumption at rated output	approx. 580 sml/min
Hydrogen purity for operation	min. 4.0 (99.99%)
Permissible hydrogen pressure	0.4 … 0.8 bar

Electronic Load Module	
Maximum continuous power output	100 W
Load voltage	1.2 … 20 V DC
Load current	0 … 10 A
Mains connection	230 V (50 Hz), 115 V (60 Hz)
Dimensions (WxHxD)	400 x 297 x 135 mm

DC/DC Converter Module	
Input voltage	4.5 … 10 V DC
Output voltage	12 V DC
Max. input current	10 A
Dimensions (WxHxD)	200 x 297 x 95 mm

Traffic Light Module	
Input voltage	12 V DC
Power consumption	max. 10 W
Dimensions (WxHxD)	200 x 297 x 140 mm

H_2 Storage Module	
Storage capacity (at charge pressure of 17 bar)	250 sl
Output	1.7 sl/min
Charge pressure	10 … 17 bar
Charge time	ca. 1 h at 20°C and active cooling

Hydrogen Supply

Solar Hydrogen Trainer

Investigate the entire energy chain – from hydrogen production to the storage and consumption of hydrogen.

Solar Hydrogen Trainer	**Art. no. 810**

Hydrogen Generator HG30

Produce high-purity hydrogen for the direct operation of the Fuel Cell Trainer or for refilling the metal hydride canisters.

HG30	**Art. no. 651**
Accessories	
HG series input/ output board	**Art. no. 1801**

H_2 Connection Kit

Pressure reducer for 200 bar standard compressed gas cylinders for the refilling of the metal hydride canister.

15 bar H_2 connection kit	**Art. no. 631**

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