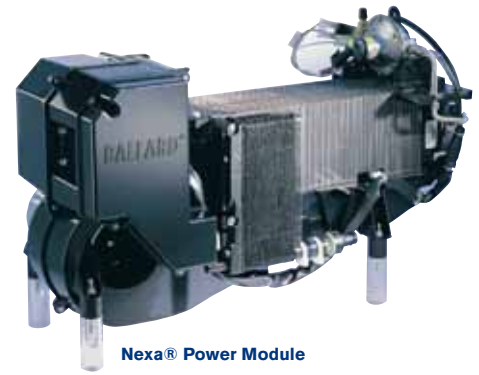
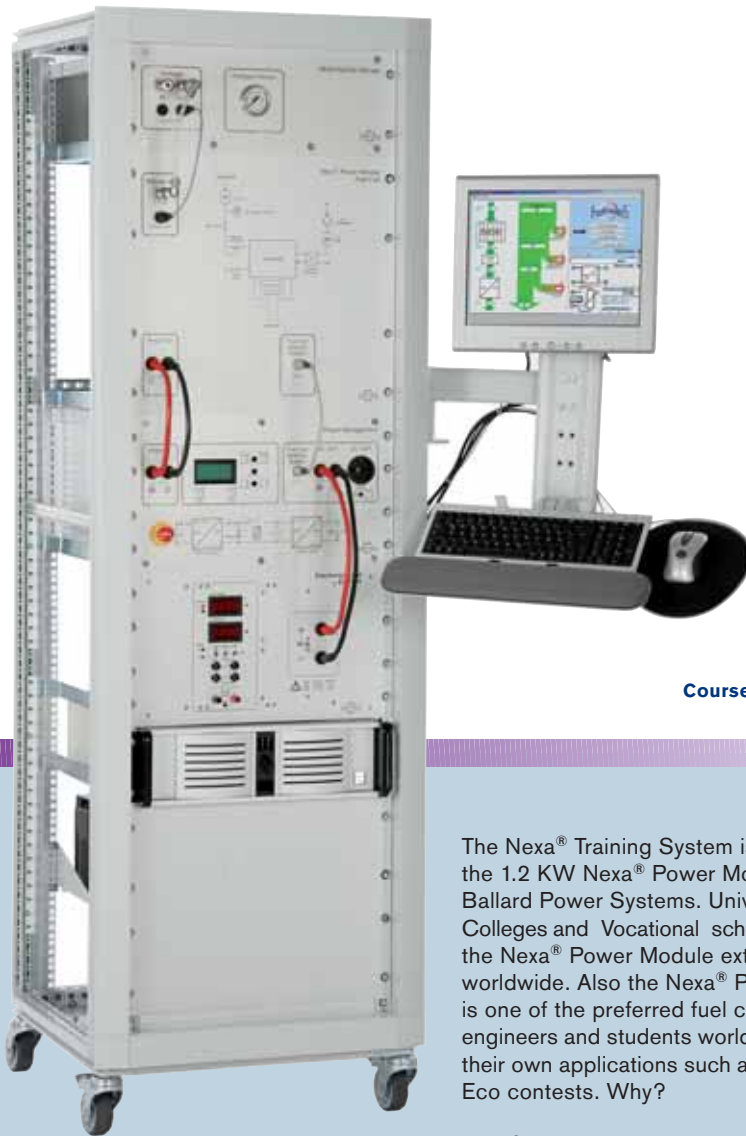


Nexa® Training System

1.2 kW fuel cell system in 19" Rack



Nexa® Power Module



Energy Management Module



DC Electronic Load

Course material



Gain Hands-On Experience with the most complete high power fuel cell training system on the market: The Nexa® Training System

- Become an expert on how to control and run a high power fuel cell stack
- Train and familiarize yourself with an approved industrial fuel cell system application
- Investigate the interaction of the fuel cell with power electronics, back-up batteries and different loads
- Determine the peak power intervals and learn how to adjust charge and discharge cycles of the back-up battery accordingly and much more....

The Nexa® Training System is based on the 1.2 KW Nexa® Power Module from Ballard Power Systems. Universities, Colleges and Vocational schools are using the Nexa® Power Module extensively worldwide. Also the Nexa® Power Module is one of the preferred fuel cell system for engineers and students worldwide to build their own applications such as vehicles for Eco contests. Why?

Nexa® Power Modules are chosen because of their high reliability, integrated safety, ease of operation and consistent output power performance.

The Nexa® Training System is the perfect training system for students and engineers to familiarize themselves with the complex technology of a fuel cell systems including all it's auxiliary components such as DC/DC converter, load, back-up battery, DC/AC inverter, Hydrogen supply and many more. All those components are integrated in the Training System and can be connected easily. You can, however, also do your own integration, as we also offer the single components to be integrated by the user as an integration kit!

Nexa® Training System Basic

- 19" Fuel Cell System Module
 - 19" Energy Management Module
 - Connection set for compressed hydrogen cylinders
 - Computer and monitor
 - Data monitoring software and training material
 - 19" Rack
- Item no. 790

Nexa® Training System Basic E+

- Nexa® Training System Basic
 - 19" DC Electronic Load
- Item no. 791

Nexa® Training System Complete

- Nexa® Training System Basic
 - 19" DC Electronic Load
 - Metal Hydride Module
- Item no. 792



Fuel Cell Powered Science

The 1.2 kW Nexa® Power Module and all auxiliary components are mounted on a 19" rack. Students and engineers learn about the fundamental characteristics of fuel cell systems, responses to changes in loads, factors effecting efficiency, power and fuel storage.

Learn step by step:

- What are the stable conditions for operation?
- Which factors influence the characteristic curves?
- What is the efficiency of the system?
- Which parasitic loads occur in operation?

All power and hydrogen based connections are easily accessed on the front panel. On the back side all communication connections can be found. Plug and play installation allows for quick setup and experiment configuration. And most important: Safe to handle!

The system is delivered with detailed user documentation and experiment instructions featuring various challenging experiments. After this comprehensive training course students have gained professional knowledge on fuel cell systems on the highest level. With its integrated control software and a handbook covering both, theoretical and experimental sections, the Nexa® Training System is ideal for self study and for demonstration purposes:

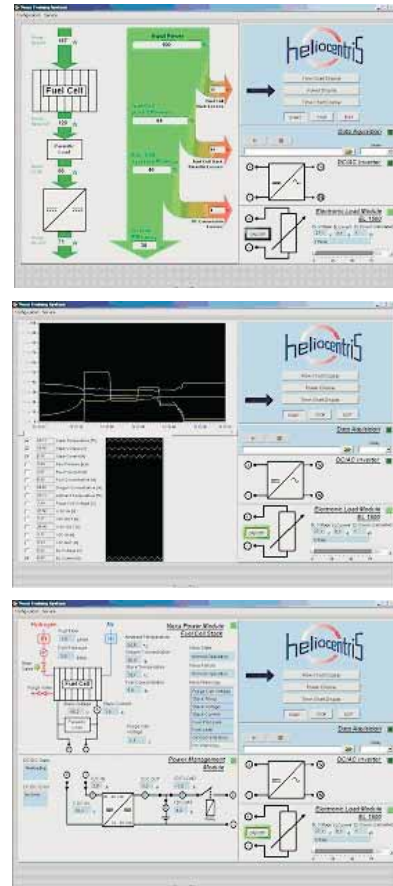
THE PERFECT TRAINING SYSTEM FOR ADVANCED FUEL CELL EDUCATION!

A PC, a monitor and a comprehensive visualisation, training and control software is included enabling the user to set hardware parameters and acquire data from all relevant components. Various display modes are available:

The **Flow Chart Display** indicates all relevant status parameters of the NEXA power module, the power management module (DC/DC converter, buffer battery), the DC/AC converter and the load

The **Power Display** provides an overview of the used, converted and available power and all further losses (fuel cell stack, parasitic and DC conversion losses), and indicates all the efficiencies

In the **Time Chart Display** up to 16 parameters can be logged and displayed simultaneously which can be processed further on



Nexa® – the integration kit

Components examples



Item no. 701



Item no. 730



Item no. 750

All components of the Nexa® Training System are also available individually for integration into customized power applications. First teach the fundamentals of fuel cells, then build a working fuel cell power application from the components.

Illustration by:
University of Applied Sciences Amberg/Weiden

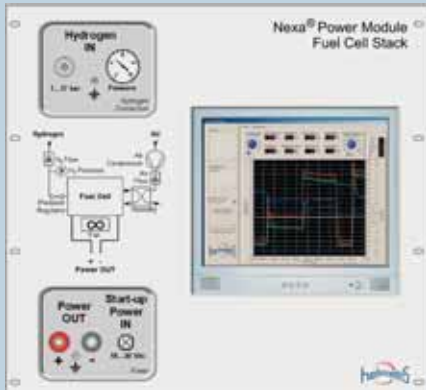


Nexa[®] Training System – the 19" modules



19" Metal Hydride Module

The Metal Hydride Module offers a safe, low pressure alternative to compressed hydrogen cylinders. Metal hydride canisters store enough hydrogen for up to four hours of operation at full power. For operation at a nominal power level, the hydrogen capacity allows for up to two days of practical experimentation without refilling.



19" Fuel Cell System Module

The Module contains a 1.2 kW Nexa[®] Fuel Cell Power Module with integrated microprocessor controller and safety features. All gas and electrical connections are accessed via quick connects on the front panel. The hydrogen pressure gauge gives an indication of fuel level. An integrated hydrogen flow meter allows accurate determination of efficiency and fuel consumption. Additional integrated components built into the stack include an air compressor, cooling fan, humidity exchanger, purge valve and microprocessor controller. The Module also includes the complete data acquisition and experimental software.



19" Energy Management Module

This module incorporates a customized DC/DC Converter and AC/DC Inverter allowing transformation of the unregulated DC-Power coming from the fuel cell. The built in DC/DC Converter also includes an integrated battery management system for optional battery hybrid configurations. All load parameters through the DC/DC Converter and AC/DC Inverter are displayed on the front panel allowing ready determination of power consumption and efficiency through the entire system.



19" DC ElectronicLoad

Precise experiments and real application simulations can be carried out with the electronic load. The load can be operated manually or via software with the PC.

Computer and Data acquisition

The PC and the control boards are installed within the bottom rack. The LCD Monitor is mounted on a flexible swivel arm.

Nexa[®] Training System

Technical Data

12_2006

19" Fuel Cell System Module

Nexa[®] Power Module

Rated net power	1200 W
DC voltage range	22 ... 50 V
Rated voltage	26 V
Rated current	46 A
Purity	≥ 99.99 % H ₂ (4.0)
Pressure	0,7 ... 17 bar (10 ... 250 PSIG)
Hydrogen consumption	max. 18,5 slpm

Hydrogen Connection Set

Single stage pressure regulator for compressed hydrogen gas cylinders;
Connecting tube with adaptors for Nexa[®] and pressure regulator;
Mounting panel for compressed hydrogen cylinders

Primary pressure	max. 200 bar (2.900 PSIG)
Secondary pressure	0 ... 15 bar (0 ... 218 PSIG)

Hydrogen Sensor

Sensor type	Hydrogen 4 %
Measuring principle	3-electrode-sensor
Standard range	0,00 ... 4,00 % vol.

Electronic Flow Meter

Measuring principle	thermal massflow
Standard range	0,6 ... 30 NI/min
Signal	0 ... 5 V DC

19" Energy Management Module

DC/DC Converter with Start- and Back-up Batteries

Nominal output voltage	24 V DC
Output voltage	22 ... 30 V DC
Output current	max. 55 A
Power	max. 1200 W
Input voltage	26 ... 48 V DC
Efficiency typ.	96 %

Batteries

Nominal voltage	24 V (2 x 12 V)
Capacity	10 Ah

110 V / 230 V DC/AC Inverter

Output voltage	110/230 V (60/50 Hz)
Output waveform	Sine wave; < 3 % THD
Continuous output power	1500 W
Short time output power	2000 W
Input voltage	24 V
Efficiency	87/89 % (110/230 V)

19" Metal Hydride Module

Metal Hydrides

Capacity	max. 3 x 940 NI H ₂ (2.820 NI H ₂)
Delivery rate	max. 3 x 5.5 NI/min (16,5 NI/min)
Nominal pressure	approx. 8 bar (118 PSIG)
Refilling pressure	10 ... 17 bar (150 ... 250 PSIG)

The module will have installed a pressure gauge to get the filling status of the canisters.

19" DC Electronic Load Module

Electronic Load

Electronic load module for Nexa[®] or DC/DC-converter usage; 19 inch case for rack mounting or table use; CC, CR and CP load modes; Integrated current and voltage measurement;

Load voltage	1 ... 75 V DC
Load current	1 ... 100 A
Load power	max. 1500 W
Power supply	115/230 V (60/50 Hz)

Integrated IEEE488.2/RS232 interface incl. LabView driver;

Additional Components

Computer and Data Acquisition

The PC and the control boards are installed in the bottom of the Rack. The LCD-Monitor is mounted on a flexible swivel arm.

19" Rack

Standard 19" Rack with plug-and-play connectors for Quick component installation.

Specifications and descriptions in this document were in effect at the time of publication. We reserves the right to change specifications or to discontinue products at any time (03/06).

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