Product datasheet (en)

Version:	1218_24.04.2017

Photo:	Name:
	leXsolar-H2 Large 2.0

Item number:
1218

Youtube link:

Area of application:	Dimensions (cm x cm x cm)
Physics Chemistry	42x35x15

Weight (kg):	User group:
2,3	Highschool / Secondary School

Key facts:

Understanding the physical basics of electrolysis and fuel cells
Mainly quantitative experiments
Two different fuel cell technologies
High quality instruction manuals

List of components:

1 x 1218-02 PEM-Fuel Cell Module

1 x 1218-03 Electrolyzer module 2.0
1 x 1218-04 Box 1218
1 x 1100-23 Potentiometer module
1 x 1100-27 Motor Module without Gear
1 x 1100-31 Solar module 2.5 V, 420 mA
1 x 1213-01 Gas storage module
1 x 1100-19 leXsolar-Base unit Large
1 x L3-01-013 Lid for tray
1 x L3-01-117 Insert "H2 Large"
1 x L3-03-258 Info sheet initial startup
1 x L2-02-017 Propeller
1 x L3-03-164 Layout diagram 1218 H2-Large

Extras needed:

1 x L2-04-022 Lamp with table clamp
2 x L2-06-012 Test lead black 25 cm
2 x L2-06-013 Test lead red 25 cm
1 x 9100-05 PowerModule
1 x 9100-03 AV-Module

Extras available:

1218-02 PEM-Fuel Cell Module
L3-03-044 Schülerheft leXsolar-H2 Large
L3-03-060 Lehrerheft leXsolar-H2 Large
1200-17 H2 Charger
1200-19 H2 Storage complete
1700-01 leXsolar ethanol fuel cell module
9102 leXsolar-SmartControl Large
L3-03-045 Student´s manual leXsolar-H2 Large
L3-03-061 Teacher´s manual leXsolar-H2 Large

Description:

This product was completely reworked and now contains the newest fuel cells for educational purposes. Together with the already established PEM-fuel cells and the components of a complete solar-hydrogen cycle (electrolyzer, PEM fuel cell and solar module), this product represents the most comprehensive fuel cell experimentation system on the educational market.
The electrical consumer (motor) allows for realistic and demonstrative experiments. Highly didactical instruction manuals complete the product.
leXsolar-H2 Large can be used in physics and chemistry class as well as in technology class.
The product can be expanded with two additional PEM-fuel cells to illustrate the stacking of fuel cells. The expansion ethanol-fuel cell demonstrates a second fuel cell technology.

Experiments:

Set up of an electrolyzer and the different fuel cells
Characteristics of an electrolyzer
Operation of an electrolyzer
Characteristics of a PEM-Fuel cell
Operation of the PEM-Fuel cell
Faraday and energy efficiency of the electrolyzer
Faraday and energy efficiency of the PEM-fuel cell

Specifications of components

1218-02 PEM-Fuel Cell Module:
high perfomance PEM fuel cell
converts hydrogen and oxygen into electricity and water

1218-03 Electrolyzer module 2.0:

1100-23 Potentiometer module:
Plug-in module with adjustable resistance
Resistance continuously adjustable: 0 - 1.1 kOhm
Maximum current: 200mA
Module contains two potentiometers connected in seris (1 x 100 Ohm and 1 x 1 kOhm)
Allows an exact adjustment of the resistance while having a large resistance range
Layout: plug-in module with 4mm jacks
Grid-dimension of the jacks: 70mm
Module size: 85mmx85mm

1100-27 Motor Module without Gear:
Plug-in module with DC-motor
Initial current: 20 mA
Initial voltage: 0.35 V
Equipped with automatic fuse protecting from overvoltage
Layout: plug-in module with 4 mm jacks
Grid-dimension of the jacks: 70 mm
Module size: 85 mm x 85 mm

1100-31 Solar module 2.5 V, 420 mA:
Solar module with 5 high efficiency polycrystalline solar cells
2.5 V open circuit voltage
420 mA short circuit current
1 Wp peak power
Optimized low light behaviour
Solar cell size 5 pcs. 26 mm x 52 mm
Contacting via 4mm jacks
With connecting 4mm banana plugs the module can be set up with an angle of ca. 80°
Grid-dimension of the jacks: 70 mm
Module size: 85 mm x 151 mm

1213-01 Gas storage module:

1100-19 leXsolar-Base unit Large:
Main board for the leXsolar plug-in system with 3 slots
Grid-dimension of the plugs: 70 mm
Enables series and parallel connectsion of the modules
Changing between series and parallel connection by turning the modules
Equipped with 4 additional 4 mm jacks for connecting measuring lines

L3-01-013 Lid for tray:

L3-01-117 Insert "H2 Large":

L3-03-258 Info sheet initial startup:

L2-02-017 Propeller:

L3-03-164 Layout diagram 1218 H2-Large:

Specifications extras needed:

L2-04-022 Lamp with table clamp:
Lamp with table clamp for attachment to the edge of a table. Optimal for providing lighting for the solar panels during indoor experiments.

L2-06-012 Test lead black 25 cm:
The black test lead is used for the electrical connection of the modules. The cable is directly plugged into the base plate or alternatively directly into the plug connection of the modules. The cables have two different colors to distinguish between the positive and the negative pole. The black cables are plugged into the negative pole.

L2-06-013 Test lead red 25 cm:
The red test lead is used for the electrical connection of the modules. The cable is directly plugged into the base plate or alternatively directly into the plug connection of the modules. The cables have two different colors to distinguish between the positive and the negative pole. The red cables are plugged into the positive pole.

9100-05 PowerModule:
The PowerModule is a compact, robust and easy-to-use power supply for experiments. The voltage can be varied incrementally in 0.5V steps from 0 to 12V. It supplies up to 24W output power!
With the acoustic feedback during operation and the voltage indicator by LEDs it is simple and intuitive for the user. With only 70g it is the most lightweigt power supply of its power class. Due to the design as leXsolar plug-in module it is fully compatible with all leXsolar experiments. However, it can also be used in other setups with standard 4mm-connectors.

With software control* continuous variable voltages - even time-dependent - can be realized.

Technical data:

Output voltage 0-12V DC
Maximum current 2A
Maximum output power 24W
Automatic overcurrent detection
Voltage variation in 0.5V steps (manually) or continuous (with software* via USB-Connect* or Wireless-Connect*)
Accuracy: +-0.15V
Contacts: 4mm standard connectors and compatible to leXsolar main board
Input voltage 110-230V AC 50-60Hz
Adaptors for all common sockets included
Weight: 70g (+180g included wall power supply)
RiSU conform

***Please ask for availability**

9100-03 AV-Module:
The IV-Module is able to measure current and voltage and therefore replaces conventional multimeters completely. With touch buttons three measurement modes can be selected: current, voltage and combined current-/voltage-measurement.
leXsolar AV-Module is intuitive and easy to use but yet allows precice and professional measurements. A high resolution graphics display shows the measurement values as well as visualizes the measurement modes.

Technical specifications:

Voltage measurement:
- Range: 0...12 V
- Accuracy: 1mV
- Overvoltage protection >12V

Current measurement
- Range: 0...2 A
- Accuracy: 0.1mA (0...199mA) and 1mA (200mA...1A)
- Automatic fuse protection >2A (reactivation with touch button)
- Internal resistance <0.5 Ohm (0...200mA); <0.2 Ohm (200mA...2A)

Electrical connection:
- compatibel to leXsolar-basic unit
- 4mm-banana plugs

Display: Graphics display resolution192x192

Power supply: 2 x AA battery or rechargeable

Interfaces:
- Display to read the measurement values
- leXsolar USB-Connect* for direct PC-connection
- leXsolar Wireless-Connect* for wireless data acquisition

***Please ask for availability**

Specifications extras available:

1218-02 PEM-Fuel Cell Module:
high perfomance PEM fuel cell
converts hydrogen and oxygen into electricity and water

L3-03-044 Schülerheft leXsolar-H2 Large:

L3-03-060 Lehrerheft leXsolar-H2 Large:

1200-17 H2 Charger:
The H2 Charger is an independent and easy solution for the production of hydrogen. The system is compatible with all PEM-fuel cell systems of the leXsolar experimentation kits. Components like gas cylinders are not needed as the hydrogen is stored directly as metal hydride in the H2 Storage.

Technical data:
Weight: 1.8kg
Usable water: de-ionized or distilled water (10 … 40°C)
Water usage: approx. 20ml/h
Release pressure: 0-3.0 MPa
Gas generation: up to 3 l/h
Purity of produced hydrogen: 99.99%
Charging time for one H2-Storage: approx. 4 hours

1200-19 H2 Storage complete:
The H2 Storage allows for the simple and safe storage of hydrogen as metal hydride. The storage module is easily filled with the H2 Charger or from a gas cylinder. The adjustable valve releases the hydrogen again.

Technical data:
Capacity: 10 l (approx. 0.9 g hydrogen)
Max. pressure: 3 MPa (20°C)
Release pressure: 0...3.0 MPA (25°C)
Connection: M6-winding
Including valve

Also available without valve (Item-No. 1200-18)

1700-01 leXsolar ethanol fuel cell module:
Ethanol fuel cell for conversion of chemical energy into elecrical energy
Stack of two fuel cells with separately contactable single fuel cells
For ethanol solution with concentration up to 20%
Recommended ethanol concentration for continuous operation 10%
Open circuit voltage Voc = 1 V (double cell)
Maximum short circuit current Isc = 40 mA
Maximum peak power P = 10mW

Approx. continuous power P = 2mW (at least 2 min.)

9102 leXsolar-SmartControl Large:
SmartControl Large provides a convenient collection of SmartControl modules for every product of the leXsolar-Large series.There is no need for additional measuring instruments, power supplies or cables. Additionally, a SmartGrid can be built through the combination of the included SmartMeter modules and multiple leXsolar products. The package also contains three leXsolar-WirelessConnect which allow wireless control over the experiments using a Windows-PC. If mobile devices or other platforms are used, an extra SmartControl Server is needed.

L3-03-045 Student´s manual leXsolar-H2 Large:
The instruction manuals are available as PDF and Word versions in the online portal. A description of how to download the booklets is attached to every experiment set.

L3-03-061 Teacher´s manual leXsolar-H2 Large:
The experiment handbooks are available as PDF and Word versions in the online portal. A description of how to download the booklets is attached to every experiment set.