

**Product datasheet (en)**

Version: 1219\_17.05.2017

Photo:



Name:

leXsolar-H2 Ready-to-go 2.0

Item number:

1219

Youtube link:

Area of application:

Physics  
Chemistry  
Chemical and Environmental Engineering  
Electrical Engineering  
Renewable Energies  
Technology Training

Dimensions (cm x cm x cm)

Weight (kg):

8,5

User group:

Basic Training  
Highschool / Secondary School  
Middle School / Junior High School  
Industrial Customers

Key facts:

Comprehensive experimentation system on fuel cell technology  
Different fuel cell technologies: PEM- and Ethanol-Fuel cells  
Buildable fuel cell stacks with three PEM-fuel cells  
Easy hydrogen generation and storage with H2 Charger and H2 Storage  
Includes all ancillary equipment

**List of components:**

1 x 1100-19 leXsolar-Base unit Large  
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 1200-17 H2 Charger  
1 x 1200-18 H2 Storage  
1 x 1213-01 Gas storage module  
3 x 1218-02 PEM-Fuel cell module  
1 x 1218-03 Electrolyzer module 2.0  
1 x 1700-01 leXsolar ethanol fuel cell module  
1 x 1219-01 Koffer 1219  
0,15 x L2-02-048 Silicone tube 2 mm  
1 x L2-02-017 Propeller  
1 x L2-04-022 Lamp with table clamp  
2 x L2-06-011 Digital multimeter  
2 x L2-06-012 Test lead black 25 cm  
2 x L2-06-013 Test lead red 25 cm  
1 x L2-06-014 Test lead black 50 cm  
1 x L2-06-015 Test lead red 50 cm  
1 x L2-06-132 Valve for H2 Storage  
1 x L3-01-103 Insert H2 Ready-to-go  
1 x L3-03-258 Info sheet initial startup  
1 x L3-03-163 Layout diagram 1219 H2 Ready-to-go 2.0

**Extras needed:**

No extras needed, all included.

**Extras available:**

L3-03-083 Anleitungsheft leXsolar-H2 Ready-to-go  
L3-03-082 Lehrerheft leXsolar-H2 Ready-to-go  
L3-03-095 Instructions manual leXsolar-H2 Ready-to-go  
L3-03-100 Teacher's manual leXsolar-H2 Ready-to-go  
1200-18 H2 Storage  
L2-04-044 electric grid adapter set  
1100-63 DC converter 120V - 240V

**Description:**

leXsolar-H2 Ready-to-go offers the entire spectrum of current fuel cell technology for the classroom. This product was completely reworked and now contains the newest fuel cells for educational purposes. Solar module, electrolyzer, and fuel cell permit the assembling and examination of a solar-hydrogen cycle. Working principles, efficiency and characteristics curves of electrolyzer and fuel cell are just some of the topics covered.

Beside the PEM-fuel cell, it also contains an ethanol-fuel cell in order to compare the different technologies. H2 Charger and H2 Storage allow for the easy generation and storage of hydrogen. True to the traditions of the Ready-to-go series all ancillary equipment is already included in the robust aluminum suitcase.

#### Experiments:

Set up of an electrolyzer and the different fuel cells  
What does an electrolyzer do?  
Characteristics of an electrolyzer  
Hydrogen production with the H2 Charger  
Hydrogen storage with the H2 Storage technology  
Characteristics of a PEM-Fuel cell  
Characteristics of an Ethanol-Fuel cell  
Faraday and energy efficiency of the electrolyzer  
Faraday and energy efficiency of the PEM-fuel cell  
Parallel- and series connection of PEM-fuel cells

#### Specifications of components

##### 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 connection of the modules  
Changing between series and parallel connection by turning the modules  
Equipped with 4 additional 4 mm jacks for connecting measuring lines

##### 1100-23 Potentiometer module:

Plug-in module with adjustable resistance  
Resistance continuously adjustable: 0 - 1.1 kOhm  
Maximum current: 1A  
Module contains two potentiometers connected in series (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

**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

**1200-18 H2 Storage:**

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

**1213-01 Gas storage module:**

**1218-02 PEM-Fuel cell module:**

**1218-03 Electrolyzer module 2.0:**

**1700-01 leXsolar ethanol fuel cell module:**

Ethanol fuel cell for conversion of chemical energy into electrical 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  $V_{oc} = 1 \text{ V}$  (double cell)  
Maximum short circuit current  $I_{sc} = 40 \text{ mA}$   
Maximum peak power  $P = 10 \text{ mW}$   
Approx. continuous power  $P = 2 \text{ mW}$  (at least 2 min.)

**L2-02-048 Silicone tube 2 mm:**

**L2-02-017 Propeller:**

**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.

**L2-06-011 Digital multimeter:**

TÜV/GS-approved Pocket size mini Multimeter.

**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.

**L2-06-014 Test lead black 50 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.

**L2-06-015 Test lead red 50 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.

**L2-06-132 Valve for H2 Storage:**

**L3-01-103 Insert H2 Ready-to-go:**

**L3-03-258 Info sheet initial startup:**

**L3-03-163 Layout diagram 1219 H2 Ready-to-go 2.0:**

**Specifications extras needed:**

**No extras needed, all inclusive.**

**Specifications extras available:**

**L3-03-083 Anleitungsheft leXsolar-H2 Ready-to-go:**

**L3-03-082 Lehrerheft leXsolar-H2 Ready-to-go:**

**L3-03-095 Instructions manual leXsolar-H2 Ready-to-go:**

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.

**L3-03-100 Teacher´s manual leXsolar-H2 Ready-to-go:**

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..

**1200-18 H2 Storage:**

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**

**L2-04-044 electric grid adapter set:**

**1100-63 DC converter 120V - 240V:**