

## Product datasheet (en)

Version: 1803\_24.09.2014

Photo:



Name:

leXsolar-Emobility Ready-to-go

Item number:

1803

Youtube link:

Area of application:

Physics  
Technology Training

Dimensions (cm x cm x cm):

Weight (kg):

User group:

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

Key facts:

Extensive experimentation system for battery technology  
Eight different storage types  
Various experiments for E-mobility possible  
Including ChargerModule  
No additional equipment needed

## List of components:

1 x 1118-09 Battery module NiMH 3xAAA Pro  
1 x 1118-11 Capacitor module Pro  
1 x 1800-01 Resistor module (triple) Pro  
1 x 1800-03 Resistor plug element 1 Ohm  
1 x 1800-04 Resistor plug element 100 Ohm  
2 x 1800-05 Resistor plug element 10 Ohm  
1 x 1800-07 Lithium-polymer (LiPo)-battery module  
1 x 1800-08 Battery module holder 1xAAA Pro  
1 x 1800-13 Lead (Pb) -battery module Pro  
1 x 1801-02 Electric model car  
1 x 1801-06 LiFePo-battery AAA  
1 x 1801-07 leXsolar-Base unit EMobility  
1 x 1803-01 Koffer 1803  
1 x 1100-62 Potentiometermodul 110 Ohm Pro  
1 x 1800-15 Distilled water (100 ml)  
1 x 9100-13 ChargerModule  
1 x 9100-03 AV-Modul  
1 x L3-01-130 Insert EMobility Rtg 1803  
1 x L3-03-016 leXsolar-CD  
1 x L2-04-102 NiZn-battery AAA  
1 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 L2-06-067 Reversible Fuel cell  
1 x L3-03-167 Einräumplan 1803 EMobility Ready-to-go  
1 x L2-04-021 NiMH battery AAA

## Extras needed:

No extras needed, all included.

## Extras available:

No extras available.

## Description:

This product teaches the physical and technical foundations and applications of different battery technologies. Eight different battery types like lithium-polymer battery, capacitor or fuel cell allow for the study of characteristics like lifespan and charging methods. Qualitative and quantitative experiments are used to explore the properties of various battery types. The electric car can be run with all included storage types.

With the integrated ChargerModule batteries are always ready to use and battery charging methods can be addressed in experiments.

Like the other products of the Ready-to-go line, the leXsolar-EStore Ready-to-go amazes with its flexible and location-independent usability that doesn't require any additional equipment.

## Experiments:

Ohm`s law  
Series connection of ohmic resistances  
Parallel connection of ohmic resistances  
Nominal voltage and capacity of voltage sources  
Four-terminal sensing  
Internal resistance of voltage sources  
Series connection of voltage sources  
The capacitance of a battery module  
The energy density of battery modules  
The Ri efficiency of a battery module  
The total efficiency of a battery module  
Temperature-dependent behavior of the lithium-polymer cell  
The charging process of a capacitor  
The discharge process of a capacitor  
I-V characteristics of the single NiMH battery module  
I-V characteristics of the NiZn battery module  
I-V characteristics of the LiFePo battery module  
I-V characteristics of the lead battery module  
I-V characteristics of the lithium-polymer battery module  
I-V characteristics of the triple NiMH battery module  
The charging process of the NiMH battery  
The charging process of the NiZn battery  
The charging process of the LiFePo battery  
The charging process of the lead battery  
The charging process of the lithium-polymer battery  
The discharging process of a battery module  
Hydrogen production in the reversible hydrogen fuel cell  
Characteristic curve of the electrolyzer  
Hydrogen consumption of a fuel cell  
Characteristic curve of the fuel cell  
The efficiency of the hydrogen fuel cell  
Operation of the electric car with several battery modules  
Operation of the electric car with the reversible fuel cell

## Specifications of components:

1118-09 Battery module NiMH 3xAAA Pro:  
Battery module for experiments concerning charge regulation  
3 x NiMH-battery (AAA) 600 mAh  
Equipped with automatic fuse protecting against short circuit  
Layout: plug-in module with 4 mm jacks  
3-terminal plug-in module for use in circuits with common ground  
Grid-dimension of the jacks: 70 mm  
Module size: 85 mm x 85 mm

1118-11 Capacitor module Pro:  
Capacitor module for simulating batteries in experiments  
Extremely high capacity: 5 F

Voltage: 5,4 V

Equipped with automatic fuse protecting against short circuit

Layout: plug-in module with 4 mm jacks

3-terminal plug-in module for use in circuits with common ground

Grid-dimension of the jacks: 70 mm

Module size: 85 mm x 85 mm

1800-01 Resistor module (triple) Pro:

1800-03 Resistor plug element 1 Ohm:

1800-04 Resistor plug element 100 Ohm:

1800-05 Resistor plug element 10 Ohm:

1800-07 Lithium-polymer (LiPo)-battery module:

1800-08 Battery module holder 1xAAA Pro:

1800-13 Lead (Pb) -battery module Pro:

1801-02 Electric model car:

1801-06 LiFePo-battery AAA:

1801-07 leXsolar-Base unit EMobility:

1800-15 Distilled water (100 ml):

9100-13 ChargerModule:

The ChargerModule is a universal battery charger for all batteries included in leXsolar-EStore. It ensures that all batteries are always ready to use and that no deep discharge occurs. As a consequence, the batteries will have a longer lifetime.

The ChargerModule enables a lot of experiments concerning battery charging methods. Charging methods such as the CC-CV method or minus-delta-U method for NiMH batteries can be investigated in detail.

Charging programs for:

- NiMH-battery
- Electrolyzer
- NiZn-battery
- Pb-battery
- LiFePo4-battery

- LiPo-battery
- NiMH-battery 3-pack
- Capacitor (super cap)
- Additional fixed voltage outputs 3V and 6V

#### 9100-03 AV-Modul:

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 precise 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:

- compatible to leXsolar-basic unit
- 4mm-banana plugs

Display: Graphics display resolution 192x192

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

\*available 2015

L3-01-130 Insert EMobility Rtg 1803:

L3-03-016 leXsolar-CD:

The leXsolar-CD covers all student and teacher manuals as pdf- and word-file. If you need manuals as printed version, you can order them separately.

L2-04-102 NiZn-battery AAA:

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.

**L2-06-067 Reversible Fuel cell:**

**L2-04-021 NiMH battery AAA:**

Specifications extras needed:

No extras needed, all inclusive.

Specifications extras available:

No extras available.