

## Product datasheet (en)

Version: 1801\_18.10.2017

Photo:



Name:

**leXsolar-Emobility Professional**

Item number:

**1801**

Youtube link:

Area of application:

**Electrical Engineering  
Automotive Engineering  
Renewable Energies**

Dimensions (cm x cm x cm)

**64x37x16,5**

Weight (kg):

**6**

User group:

**Basic Training  
Industrial Customers**

Key facts:

**Battery trainer for the technical training  
Battery types: NiMH, NiZn, Pb, LiFePo, LiPo, capacitor (supercap) and fuel cell  
All components are prepared for four terminal sensing  
Including ChargerModule**

List of components:

**1 x 1118-02 Motor module Pro**

- 1 x 1118-09 Battery module NiMH 3xAAA Pro
- 1 x 1118-11 Capacitor module Pro
- 1 x 1400-13 leXsolar-base unit Professional
- 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
- 3 x 1800-05 Resistor plug element 10 Ohm
- 1 x 1800-06 Resistor plug element 33 Ohm
- 1 x 1800-07 Lithium-polymer (LiPo)-battery module
- 1 x 1800-08 Battery module holder 1xAAA Pro
- 1 x 1800-09 Battery adapter cable
- 1 x 1800-12 Fuel cell holder 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 9100-13 ChargerModule
- 1 x 9100-03 AV-Module
- 1 x 1100-62 Potentiometer module 110 Ohm Pro
- 1 x L2-02-017 Propeller
- 1 x L2-04-059 Safety test lead, 50cm, red
- 1 x L2-04-060 Safety test lead, 50cm, black
- 1 x L2-04-066 Safety test lead, 25cm, red
- 1 x L2-04-067 Safety test lead, 25cm, black
- 1 x L2-04-102 NiZn-battery AAA
- 3 x L2-05-068 Safety short-circuit plug, with mid socket
- 1 x L2-06-011 Digital multimeter
- 1 x L2-06-067 Reversible Fuel cell
- 1 x L3-01-072 Aluminium case Emobility-Professional
- 1 x L3-01-092 Insert EMobility Professional 1801
- 1 x L3-03-258 Info sheet initial startup
- 1 x L2-04-021 NiMH battery AAA
- 1 x L3-03-165 Layout diagram 1801 leXsolar-EMobility Professional

**Extras needed:**

No extras needed, all included.

**Extras available:**

- L3-03-105 Anleitungsheft leXsolar-Emobility Professional
- L3-03-106 Experimentierhandbuch leXsolar-EMobility Professional
- L3-03-107 Instructions manual leXsolar-EMobility Professional
- L3-03-108 Experiment guide leXsolar-EMobility Professional
- L2-04-044 electric grid adapter set

**Description:**

For storing electrical energy many different battery technologies are already on the market. But what application needs which battery type, what capacity does the battery need to have and what loading performance is the best to guarantee a long durability?

Due to the problem of storing renewable energy, these are questions which need to be worked on in technical training.

With leXsolar-EMobility Professional, the characteristics of different battery types can be analyzed. In addition, the kit helps students to find out more about the different fields of application. The kit comes with different battery technologies such as lead, NiMH or Lithium-Polymer(LiPo) as well as a PEM-fuel cell. For the correct determination of the internal resistance four-terminal sensing is possible.

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

#### Experiments:

Setup of a simple circuit

Ohm`s law

Series connection of ohmic resistances

Parallel connection of ohmic resistances

Start-up and idling behavior of a motor

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

1118-02 Motor module Pro:

**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

**1400-13 leXsolar-base unit Professional:**

Main board for up to 4 plug-in modules

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 12 additional 4mm security jacks for connecting security measuring lines

Each single plug-in module can be contacted externally

Enables current measurement between each module

**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:****1800-06 Resistor plug element 33 Ohm:****1800-07 Lithium-polymer (LiPo)-battery module:****1800-08 Battery module holder 1xAAA Pro:****1800-09 Battery adapter cable:****1800-12 Fuel cell holder Pro:**

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

**1801-02 Electric model car:**

**1801-06 LiFePo-battery AAA:**

**9100-13 ChargerModule:**

The ChargerModule is a universal battery charger for all batteries included in leXsolar-EMobility. 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 fixed-voltage respectively fixed-current charging methods 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

**RiSU konform**

**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 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

\*Please ask for availability

**1100-62 Potentiometer module 110 Ohm Pro:**

**L2-02-017 Propeller:**

**L2-04-059 Safety test lead, 50cm, red:**

**L2-04-060 Safety test lead, 50cm, black:**

**L2-04-066 Safety test lead, 25cm, red:**

**L2-04-067 Safety test lead, 25cm, black:**

**L2-04-102 NiZn-battery AAA:**

**L2-05-068 Safety short-circuit plug, with mid socket:**

**L2-06-011 Digital multimeter:  
TÜV/GS-approved Pocket size mini Multimeter.**

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

**L3-01-072 Aluminium case EMobility-Professional:**

**L3-01-092 Insert EMobility Professional 1801:**

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

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

**L3-03-165 Layout diagram 1801 leXsolar-EMobility Professional:**

**Specifications extras needed:**

**No extras needed, all inclusive.**

**Specifications extras available:**

**L3-03-105 Anleitungsheft leXsolar-EMobility Professional:**

**L3-03-106 Experimentierhandbuch leXsolar-EMobility Professional:**

**L3-03-107 Instructions manual leXsolar-EMobility Professional:**

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.

**L3-03-108 Experiment guide leXsolar-EMobility Professional:**

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.

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