

## Product datasheet (en)

Version: 1404\_08.08.2016

Photo:

Name:



leXsolar-Wind Large

Item number:

1404

Youtube link:

Area of application:

Dimensions (cm x cm x cm)

Physics

42x35x15

Weight (kg):

User group:

3,1

Highschool / Secondary School

Key facts:

Wind energy experiments for high schools  
Understanding wind energy: from physics to application  
Contains the innovative leXsolar-wind rotor set

List of components:

1 x 1100-19 leXsolar-Base unit Large  
1 x 1100-22 Resistor module

1 x 1100-23 Potentiometer module  
1 x 1400-01 leXsolar-Savonius rotor modulw  
1 x 1400-07 Capacitor module 220 mF, 2.5V  
1 x 1400-08 LED-module 2mA, red  
1 x 1400-12 leXsolar-Wind rotor set  
1 x 1400-19 Wind machine  
1 x 1400-22 Wind turbine module  
1 x 1404-02 Box 1404  
1 x 1100-25 Buzzer module  
1 x 1100-26 Light bulb module  
1 x 1100-27 Motor module without gear  
1 x 1100-28 Color discs - Set 1  
1 x L3-01-013 Lid for tray  
1 x L3-01-023 Insert Wind Large 1404  
1 x L3-03-132 Layout diagram 1404 Wind Large  
1 x L3-03-258 Info sheet initial startup

#### Extras needed:

1 x 9100-03 AV-Module  
1 x 9100-05 PowerModule  
2 x L2-06-012 Test lead black 25 cm  
2 x L2-06-013 Test lead red 25 cm

#### Extras available:

1400-02 Anemometer with mount  
L3-03-124 Lehrerheft leXsolar-Wind Large  
L3-03-070 Schülerheft leXsolar-Wind Large  
L3-03-072 Student's manual leXsolar-Wind Large  
L3-03-126 Teacher's manual leXsolar-Wind Large

#### Description:

This system provides you with all the answers you need concerning the basics of using wind energy. With the help of curriculum-based trials, it discusses different topics which are necessary for understanding the functions of wind power plants. The study of how wind speed, wind direction or rotor type influences the power output are only some examples of possible experiments. Both qualitative experiments for students from age of 11 to 13, and complete quantitative trials for physics lessons until the age of 19 are described in detail.

#### Experiments:

Influence of the wind speed on a wind turbine  
Start-up wind speed at a wind turbine  
Comparison of the start-up wind speed of a Savonius and a three-blade rotor

Change the turbine voltage by connecting a consumer  
Examine the wind speed behind the rotor  
Energy balance sheet at a wind turbine  
Calculating the efficiency of a wind turbine  
Storing electric energy  
Energy conversion in a wind turbine  
Examine color wheels using a wind turbine  
Comparison of a Savonius rotor and a three-blade rotor  
Comparison of two, three and four-blade rotors  
Characteristic curves of a wind turbine  
Influence of the wind direction  
Influence of the rotor blade pitch  
Influence of the rotor blade pitch on the start up speed of a wind turbine  
Influence of the blade shape

#### 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

##### **1100-22 Resistor module:**

Plug-in module with 33 Ohm resistor  
Tolerance: 5 %  
Maximum power: 2 W  
Layout: plug-in module with 4 mm jacks  
Grid-dimension of the jacks: 70 mm  
Module size: 85 mm x 85 mm

##### **1100-23 Potentiometer module:**

Plug-in module with adjustable resistance  
Resistance continuously adjustable: 0 - 1.1 kOhm  
Maximum current: 1 A  
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

##### **1400-01 leXsolar-Savonius rotor module:**

Savonius wind turbine  
Starting wind speed: ca. 3.3 m/s  
Nominal voltage (at a wind speed of 5 m/s): 0.4 V  
Dimensions of the rotor: h=60 mm, d=80 mm  
Layout: plug-in module with 4 mm jacks  
Grid-dimension of the jacks: 70 mm  
Module size: 85 mm x 85 mm

**1400-07 Capacitor module 220 mF, 2.5V:**  
Capacitor plug-in module

**Capacity: 220 mF**  
**Voltage: 2.5 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**

**1400-08 LED-module 2mA, red:**  
**LED plug-in module**  
**Red LED (maximum emission at 697 nm)**  
**Minimum voltage: 1.7 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**

**1400-12 leXsolar-Wind rotor set:**  
**Set of rotor blades and hubs to set up different wind turbines**  
**4 rotor blades with optimized profile**  
**4 rotor blades with flat rectangular profile**  
**5 hubs for setting up 3-blade rotors with pitches 20°, 25°, 30°, 50° and 90°**  
**1 hub for setting up 4-blade rotor with pitch of 25°**  
**1 Cap for 3-blade rotor and 1 cap for 4-blade rotor**  
**Allows setting up 24 different wind turbines**  
**Easy assembling and disassembling without tools**

**1400-19 Wind machine:**

**1400-22 Wind turbine module:**  
**Wind turbine module for attaching different types of rotors**  
**Generator: maximum 6 V DC**  
**Layout: plug-in module with 4 mm jacks**  
**Grid-dimension of the jacks: 70 mm**  
**Module size: 85 mm x 85 mm**  
**including safeguard to prevent touching running blades**

**1100-25 Buzzer module:**  
**Plug-in Module with piezo buzzer**  
**Pulse tone buzzer**  
**Initial voltage: 0.7 V**  
**Initial current: 0.2 mA**  
**Layout: plug-in module with 4 mm jacks**  
**Grid-dimension of the jacks: 70 mm**  
**Module size: 85 mm x 85 mm**

**1100-26 Light bulb module:**  
**Plug-in module with micro bulb**  
**Initial voltage: 0.9 V**  
**Initial current: 25 mA**  
**Maximum voltage: 6 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**

**1100-27 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**

**1100-28 Color discs - Set 1:**

**Color discs for demonstration of color mixture and optical illusions**

**Contains a mount with 2 clips for attaching the discs**

**Mount fits axles of 2mm diameter**

**Included color discs:**

**Red-green-blue**

**Red-blue**

**Red-green**

**blue-green**

**Hue disc**

**Optical illusion: relief**

**Optical illusion: color formation**

**Stroboscope disc**

**L3-01-013 Lid for tray:**

**L3-01-023 Insert Wind Large 1404:**

**L3-03-132 Layout diagram 1404 Wind Large:**

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

#### **Specifications extras needed:**

**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:

- compatibel 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

#### 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 lightweight 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:  $\pm 0.15V$

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

**Specifications extras available:**

**1400-02 Anemometer with mount:**

**Anemometer for use with the leXsolar-Wind Large. Also usable with mount for plugging onto main board or onto wind turbine module**

**Measurement range of wind speed: 0.2 m/s - 30 m/s**

**Tolerance: 5%**

**Measurement units: mph, km/h, m/s or knots**

**Maximum wind speed memory**

**LCD backlight display**

**Auto power off**

**Waterproof**

**Incl. battery (CR 2032)**

**Battery lifetime: 12 Month (depending on power-on time)**

**Dimensions: 39 x 17 x 98 mm**

**L3-03-124 Lehrerheft leXsolar-Wind Large:**

**L3-03-070 Schülerheft leXsolar-Wind Large:**

**L3-03-072 Student's manual leXsolar-Wind 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.**

**L3-03-126 Teacher's manual leXsolar-Wind 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.**