Product datasheet (en)

Version:	2003_03.06.2019

Photo:	Name:
	leXsolar-NewEnergy Ready-to-go
	Item number:
	2003
	Youtube link:
	https://www.youtube.com/watch?v=px0KewiPt2Y

Area of application:	Dimensions (cm x cm x cm)
Physics Chemistry Technology Training	

Weight (kg):	User group:
6,5	Middle School / Junior High School Highschool / Secondary School Industrial Customers

Key facts:

Renewable energies in Primary and Junior High School
Experiments with solar, wind, water power, electric mobility and fuel cell technology combined in one product
All necessary accessories like power supply, cables and measuring devices already included
Flexible usage

List of components:

1 x 1100-02 Solar module 0.5 V, 840 mA
1 x 1100-07 Solar module 1.5 V, 280 mA
1 x 1100-19 leXsolar-Base unit Large
1 x 1100-20 Lighting module
1 x 1100-23 Potentiometer module
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 1100-29 Solar cell cover set (4 pieces)
1 x 1100-31 Solar module 2.5 V, 420 mA
1 x 1600-02 Capacitor module 5.0F/5.4V
1 x 1400-08 LED-module 2mA, red
1 x 1400-12 leXsolar-Wind rotor set
1 x 1400-19 Wind machine
1 x 1400-21 Wind rotor set (assemblied)
1 x 1400-22 Wind turbine module
1 x 1602-01 leXsolar-Base unit small
1 x 1602-02 Hand generator
1 x 1800-15 Distilled water (100 ml)
1 x 1801-02 Electric model car
1 x 1900-01 Water wheel module
1 x 9100-03 AV-Module
1 x 9100-05 PowerModule
1 x L2-02-051 Silicone tube 12 mm
1 x L2-06-012 Test lead black 25 cm
1 x L2-06-013 Test lead red 25 cm
2 x L2-06-014 Test lead black 50 cm
1 x L2-06-015 Test lead red 50 cm
2 x L2-06-033 Short-circuit plug
1 x L2-06-067 Reversible Fuel cell
1 x L3-01-175 Insert NewEnergy Rtg 2003
1 x L3-03-220 Instruction for use of finger protector
1 x L3-01-187 Case NewEnergy RtG 2003
1 x L3-03-258 Info sheet initial startup
1 x L3-03-259 Layout diagram 2003 leXsolar-NewEnergy RtG
1 x L3-01-200 Deckelschaum mit Noppen

Extras needed:

No extras needed, all included.

Extras available:

No extras available.

Description:

The leXsolar-NewEnergy Ready-to-go is specifically adapted for young students in Primary and Junior High School and provides by qualitative and quantitative experiments an understanding of the topics photovoltaic, wind power, hydro power, electric mobility and fuel cells. With the enclosed Smart Control components, an innovative measuring and control system is available and all necessary accessories like power supply, cables and measuring devices are already included.
Like the other products of the Ready-to-go line, the leXsolar-NewEnergy Ready-to-go amazes with its flexible and location-independent usability that doesn't require any additional equipment.

Experiments:

Experiments Primary level

1. From muscular strength to current...to light
2. From muscular strength to current...to motion
3. From muscular strength to current...to Noise
4. The solar cell drives a motor
5. The solar module powers a buzzer
6. The solar module powers a LED
7. The larger the solar cell, the ...?
8. The solar module powers a LED
9. From the solar cell to the solar module
10. Shading of solar modules
11. The wind turbine powers a buzzer
12. The wind turbine powers a LED
13. Influence of the wind direction
14. Influence of the rotor blade shape
15. Influence of the wind speed
16. The water wheel powers a buzzer
17. Influence of the water falling height
18. Storage of solar energy
19. Storage of wind energy
20. What is an Elektrolyzer?
21. How can water be split?
22. What is a fuel cell?
23. The fuel cell drives the motor
24. The fuel cell powers the buzzer
25. Energy demand of several consumers
26. Comparison of light bulb and LED
27. Storage and output of energy...EMobility

Experiments Secondary level

1. Forms of energy and consumers
2.1. Basic structure: rotation discs
2.2 Color qualities

2.3 Mixing colors
2.4 Color-deception with the Benham-disk
2.5 Relief-disk
3. Dependence of power of a solar cell on its area
4.1 Dependence of solar cell power on angle of incidence of light (qualitative)
4.2 Dependence of solar cell power on angle of incidence of light (quantitative)
5. Dependence of power of a solar cell on the illumination intensity
6.1 Dependence of solar cell power on load
6.2 The I-V-characteristics and filling factor of a solar cell
6.3 Dependence of I-V-characteristics of a solar cell on illuminance
7.1 Influence of changing wind speeds (qualitative)
7.2 Influence of wind speed on the wind turbine (quantitative)
8. Start-up wind speed at a wind turbine
9. Changing the turbine voltage by connecting several consumers
10. Characteristic curves of a wind turbine
11.1 Influence of the number of rotor blades (qualitative)
11.2 Influence of the number of rotor blades (quantitative)
12.1 Influence of the wind direction (qualitative)
12.2 Influence of the wind direction (quantitative)
13.1 Influence of the rotor blade pitch (qualitative)
13.2 Influence of the rotor blade pitch (quantitative)
14.1 Influence of the blade shape (qualitative)
14.2 Influence of the rotor blade shape (quantitative)
15.1 Water as an energy source (qualitative)
15.2 Water as an energy source (quantitative)
16.1 Influence of the water falling height (qualitative)
16.2 Influence of the water falling height (quantitative)
17. What does an electrolyzer?
18. What does a fuel cell?
19. Characteristic curve of the electrolyzer
20. Characteristic curve of the fuel cell
21. Operation of the electric car with the reversible fuel cell

Specifications of components

1100-02 Solar module 0.5 V, 840 mA:
solar module with high efficiency polycrystalline solar cell
0.5 V open circuit voltage
840 mA short circuit current
0.4 Wp peak power
Optimized low light behaviour
Solar cell size 52 mm x 52 mm
Layout: plug-in module with 4 mm jacks
Grid-dimension of the jacks: 70 mm
Module size: 85 mm x 85 mm

1100-07 Solar module 1.5 V, 280 mA:
Solar module with 3 high efficiency polycrystalline solar cells
1.5 V open circuit voltage
280 mA short circuit current
0.13 Wp peak power
Optimized low light behaviour
Solar cell size 3 pcs. 17 mm x 52 mm

Layout: plug-in module with 4 mm jacks
Grid-dimension of the jacks: 70 mm
Module size: 85 mm x 85 mm

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

1100-20 Lighting module:
Light source for illuminating leXsolar solar modules with defined intensity
Operating voltage: 0 - 12 V
Maximum power 4 W
Maximum illumination intensity on the solar cell: 200 W/m²
Aperture of the light source: 60 mm x 60 mm
Can be used to heat the solar cell to measure its temperature dependence
Connection: 4 mm-jacks
Includes 4 pcs. E5.5 bulbs

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

1100-25 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

1100-29 Solar cell cover set (4 pieces):
4 black plastic plates
Opaque
30 mm x 30 mm
For shadowing solar cells

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

1600-02 Capacitor module 5.0F/5.4V:

1400-08 LED-module 2mA, red:
LED plug-in module
Red LED (maximum emission at 697 nm)
Mimum 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-blate 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:

1400-21 Wind rotor set (assemblied):

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

1602-01 leXsolar-Base Unit small:
Main board für the leXsolar plug-in system wirht 2 slots
Equipped with 4 additional 4 mm jacks for connection of measuring lines

1602-02 Hand generator:

1800-15 Distilled water (100 ml):

1801-02 Electric model car:

1900-01 Water wheel module:

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**

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**

L2-02-051 Silicone tube 12 mm:

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.

L2-06-033 Short-circuit Plug:
The short-circuit plugs allow the connection of both slots of the small leXsolar base unit.

L2-06-067 Reversible Fuel cell:
The reversible fuel cell consists of an electrolyzer and a fuel cell.
For rapid generation of hydrogen, the fuel cell can be connected to the ChargerModule (charging program Electrolyzer).
To charge the reversible fuel cell the applied voltage should not exceed 1.5V. Otherwise the resulting current could exceed 1A, which would damage the fuel cell.

L3-01-175 Insert NewEnergy Rtg 2003:

L3-01-187 Case NewEnergy RtG 2003:

L3-03-258 Info sheet initial startup:

L3-03-259 Layout diagram 2003 leXsolar-NewEnergy RtG:

Specifications extras needed:

No extras needed, all inclusive.

Specifications extras available:

No extras available.