

Product datasheet (en)

Version: 1105_08.08.2016

Photo:



Name:

leXsolar-PV Ready-to-go

Item number:

1105

Youtube link:

<http://www.youtube.com/watch?v=upYJmbTpBrc>

Area of application:

Physics
Technology Training

Dimensions (cm x cm x cm)

45x35x12

Weight (kg):

4,3

User group:

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

Key facts:

Extensive experimental system photovoltaics
All necessary equipment is included
Qualitative and quantitative experiments

List of components:

3 x 1100-01 Solar module 0.5 V, 420 mA
1 x 1100-02 Solar module 0.5 V, 840 mA

1 x 1100-19 leXsolar-Base unit Large
1 x 1100-20 Lighting module
1 x 1100-21 Diode module
1 x 1100-22 Resistor module
1 x 1100-23 Potentiometer module
1 x 1100-24 Gear motor module
1 x 1100-25 Buzzer module
1 x 1100-07 Solar module 1.5 V, 280 mA
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 1100-30 Color filters
1 x 1400-07 Capacitor module 220 mF, 2.5V
1 x 9100-05 PowerModule
1 x L2-05-024 Hook weight 20g
2 x L2-06-011 Digital multimeter
1 x L2-06-012 Test lead black 25 cm
1 x L2-06-013 Test lead red 25 cm
1 x L2-06-016 Laboratory thermometer
1 x L3-01-009 Aluminium case PV Rtg 1105
1 x L3-03-258 Info sheet initial startup
1 x L3-01-047 Insert PV-Ready to go
1 x L3-03-130 Layout diagram 1105 PV Ready-to-go
2 x L2-06-014 Test lead black 50 cm
2 x L2-06-015 Test lead red 50 cm
1 x L2-06-034 Luxmeter

Extras needed:

No extras needed, all included.

Extras available:

L3-03-160 Lehrerheft leXsolar-PV Ready-to-go
L3-03-034 Anleitungsheft leXsolar-PV Ready-to-go
L3-03-035 Instructions manual leXsolar-PV Ready-to-go
L3-03-263 Teacher`s manual leXsolar-PV Ready-to-go

Description:

The name says it all: this fully equipped experiment system can be used wherever you are without further components. This kit already includes all necessary ancillary equipment, like measuring equipment, and is delivered in an aluminum case with heavy-duty foam inserts. The scope of experiments ranges from simple trials that show the basic characteristics of the solar energy, to more challenging experiments dealing with topics like IV characteristics or temperature dependency of solar cells. Because of the large range of potential experiments, the product is also suitable for internal workshops in companies as well as a demonstration kit for sales representatives.

Experiments:

- 1. Understanding the leXsolar base unit**
- 2. Optical illusions**
 - 2.1 The basic setup for experiments with the color disks**
 - 2.2 Color qualities**
 - 2.3 Additive color mixing**
 - 2.4 Optical illusions with the Benham-disk**
 - 2.5 Optical illusions with the relief-disk**
- 3. Experiments about different kinds of radiation**
 - 3.1 The influence of diffuse radiation on solar cell power (qualitative)**
 - 3.2 The influence of direct radiation on solar cell power (qualitative)**
 - 3.3 The intensity of albedo-radiation of different substances (qualitative)**
- 4. Dependence of solar cell power on its area**
- 5. Dependence of solar cell power on angle of incidence of light**
 - 5.1 Dependence of solar cell power on angle of incidence of light (qualitative)**
 - 5.2 Dependence of solar cell power on angle of incidence of light (quantitative)**
- 6. Dependence of solar cell power on illuminance**
 - 6.1 Dependence of solar cell power on illuminance 1 (qualitative)**
 - 6.2 Dependence of solar cell power on illuminance 2 (qualitative)**
 - 6.3 Dependence of solar cell power on illuminance 1 (quantitative)**
- 7. Dependence of solar cell power on temperature**
- 8. Dependence of solar cell power on frequency of incident light**
- 9. The diode character of a solar cell**
 - 9.1 The dark characteristics of a solar cell**
 - 9.2 The internal resistance of a solar cell depending on reverse or forward biasing or in the dark or under illumination**
- 10. The I-V-characteristics of a solar cell**
 - 10.1 Dependence of solar cell power on load**
 - 10.2 The I-V-characteristics and filling factor of a solar cell**
 - 10.3 Dependence of I-V-characteristics of a solar cell on illuminance**
- 11. Behavior of voltage and current in series and parallel connections of solar cells**
 - 11.1 Behavior of voltage and current in series and parallel connections of solar cells (qualitative)**
 - 11.2 Behavior of voltage and current in series and parallel connections of solar cells (quantitative)**
- 12. Behavior of voltage and current of series and parallel connection of solar cells depending on shading**
 - 12.1 Behavior of voltage and current of a series connection of solar cells depending on shading (qualitative)**
 - 12.2 Behavior of voltage and current of a series connection of solar cells depending on shading (quantitative)**
 - 12.3 Behavior of voltage and current of a parallel connection of solar cells depending on shading (quantitative)**
- 13. Simulation of a stand-alone grid with photovoltaic station**
- 14. Characteristic graphs of a capacitor**
 - 14.1 Characteristic graphs of a capacitor charged by a solar cell**
 - 14.2 Discharging process of a capacitor**
- 15. Practical experiments**
 - 15.1 Determination of efficiency of some energy conversions**
 - 15.2 Rotational direction and speed of a motor**
 - 15.3 Starting and running current of a motor**

Specifications of components

1100-01 Solar module 0.5 V, 420 mA:

Solar module with high efficiency polycrystalline solar cell

0.5 V open circuit voltage

420 mA short circuit current

0.2 Wp peak power

Optimized low light behaviour

Solar cell size 26 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

1100-02 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

1100-19 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

1100-20 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

1100-21 Diode module:

Plug-in Module with Schottky-diode

Flux voltage ca. 0.3 V

Forward continuous current: 200 mA

Qualified as bypass-diode for single solar cells

Layout: plug-in module with 4 mm jacks

Grid-dimension of the jacks: 70 mm

Module size: 85 mm x 85 mm

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: 200mA
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

1100-24 Gear motor module:
Plug-in module with geared motor
Initial current: ca. 20 mA
Initial voltage: ca. 0.35 V
Minimum operating current: 10 mA
Maximum voltage: 4 V
Equipped with hook for attaching balance weights
Suitable for balance weights up to ca. 20 g
Gear reduction: 1:27
Layout: plug-in module with 4 mm jacks
Grid-dimension of the jacks: 70 mm
Module size: 85 mm x 85 mm

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

1100-07 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

1100-27 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

1100-30 Color filters:

3 color filters (blue, red, yellow)
Red: edge filter with transmission from 600nm
Yellow: edge filter with transmission from 530nm
Blue: Transmission 380 nm - 530 nm; Maximum Transmission at 450nm

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

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

L2-05-024 Hook weight 20g:

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.

L2-06-016 Laboratory thermometer:

Alcohol laboratory thermometer with red liquid. White occupied capillaries, amber stain graduation, Length according to ISO 305 mm, 6mm Ø, with suspension eye, packed in a protective plastic holder, measurement range: $-10..+ 110^{\circ}C$, graduation: $1^{\circ}C$

L3-01-009 Aluminium case PV Rtg 1105:

L3-03-258 Info sheet initial startup:

L3-01-047 Insert PV-Ready to go:

L3-03-130 Layout diagram 1105 PV Ready-to-go:

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.

L2-06-034 Luxmeter:

0-50,000 lx

3 ½ digit 11 mm LCD display and battery status indicator

Perfect for testing and measuring of lighting condition in offices, factories, hotels, etc. measured spectrum by C.I.E.

Silicon photodiode sensor

Safety: EN 61010-1

Accessories: Light sensor, battery, operating instructions

Specifications extras needed:

No extras needed, all inclusive.

Specifications extras available:

L3-03-160 Lehrerheft leXsolar-PV Ready-to-go:

L3-03-034 Anleitungsheft leXsolar-PV Ready-to-go:

L3-03-035 Instructions manual leXsolar-PV 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.

L3-03-263 Teacher`s manual leXsolar-PV 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.