Product datasheet (en)

Version:	1118_14.06.2017

Photo:

Name:

leXsolar-PV Professional

Item number:

1118

Youtube link:

Area of application:

Electrical Engineering
Renewable Energies

Dimensions (cm x cm x cm)

64x37x16,5

Weight (kg):

7,30

User group:

Basic Training
Industrial Customers

Key facts:

Photovoltaics-training system for technical training
Basics of photovoltaics
Experiments with components of PV-systems
Setup of fully equipped PV-systems in laboratory scale

List of components:

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

1 x 1100-04 Solar module 5.22 V, 380 mA
1 x 1118-05 Diode module Pro
1 x 1118-04 Potentiometer module Pro
1 x 1118-06 Shunt regulator module Pro
1 x 1118-02 Motor module Pro
1 x 1118-01 Light bulb module Pro
1 x 1400-13 leXsolar-base unit Professional
1 x 1118-08 LED module (high brightness) Pro
1 x 1118-07 Deep discharge protection module Pro
1 x 1118-10 Series regulator module Pro
1 x 1118-11 Capacitor module Pro
1 x 1118-16 Radio module Pro
1 x 1118-12 DC/ AC-Inverter Pro
1 x 1118-13 MPP-Tracker Pro
1 x 1118-15 PWM regulator Pro
1 x 1800-06 Resistor plug element 33 Ohm
3 x 1800-04 Resistor plug element 100 Ohm
2 x 1800-05 Resistor plug element 10 Ohm
3 x 1100-02 Solar module 0.5 V, 840 mA
2 x 1800-01 Resistor module (triple) Pro
3 x 1100-59 Lighting module (with safety sockets)
1 x 1118-17 Base for solar panel
2 x 9100-03 AV-Module
1 x 9100-05 PowerModule
1 x 1100-29 Solar cell cover set (4 pieces)
1 x L2-02-017 Propeller
1 x L3-01-074 Aluminium case PV Professional 1118
4 x L2-04-066 Safety test lead, 25cm, red
3 x L2-04-067 Safety test lead, 25cm, black
2 x L2-04-059 Safety test lead, 50cm, red
1 x L2-04-060 Safety test lead, 50cm, black
3 x L2-05-068 Safety short-circuit plug, with mid socket
1 x L3-01-090 Insert PV Professional 1118
1 x L3-03-258 Info sheet initial startup
1 x L2-04-080 Lamp housing
1 x L2-04-093 Illuminant 80W
1 x L3-03-181 Layout diagram 1118 PV Professional

Extras needed:

1 x L2-06-016 Laboratory thermometer

Extras available:

L3-03-084 Anleitungsheft leXsolar-PV Professional
L3-03-085 Experimentierhandbuch leXsolar-PV Professional
L3-03-093 Instructions manual leXsolar-PV Professional
L3-03-097 Experiment handbook leXsolar-PV Professional
L2-04-044 electric grid adapter set

Description:

Nowadays, a comprehensive understanding of photovoltaics is necessary for a variety of professions in the fields of renewable energies. For the relevant studies and courses of education, leXsolar-PV Professional offers the optimal tools for practical courses. The spectrum of experiments reaches from the physical fundamentals of photovoltaics, to the analysis of the components of PV-Systems, up to the design of complex PV-Systems on a laboratory scale. The experiments are designed to be equally employed for training of sales representatives, for apprenticeship, in-service training of technicians and PV-installers, as well as form basic education of engineers. leXsolar-PV Professional offers experiments for both electrical engineering and photovoltaics. But the main focus is on laboratory experiments on photovoltaic systems. Due to the modular setup, the very detailed specific characteristics of single components can be analyzed, such as the switching threshold of series or shunt regulators. Because of the integrated manual mode, the included MPP tracker enables a descriptive understanding of the really important principle of the MPP tracking. With the help of the PWM regulator the principle of pulse width modulated charging can be demonstrated. In addition, an inverter displays the generation of alternating current out of a solar panel current. The product is completed through a variety of different electrical consumers such as a super bright LED or a light bulb, which can be used to compare their efficiency. A radio, which can be powered to the solar panel, helps to increase the attentiveness of students.

Experiments:

Electrical engineering basic experiments:
Measurement of voltage current, and power Ohm's law
Series connection of resistors (voltage divider)
Parallel connection of resistors (current divider)

Photovoltaic basic experiments
Series and parallel connection of solar cells
Power dependence on the surface area of the solar cell
Power dependence on the angle of incidence
Power dependence on level of illumination
Power dependence on level of illumination under load
Internal resistance dependence on level of illumination
Shading effect on solar cells
Dark characteristic curve of solar cells
I-V-characteristics, MPP and fill factor of solar cells
Dependence of the I-V-characteristics of solar cells on level of illumination
Dependence of the I-V-characteristics of solar cells on temperature
Characteristic curve of solar modules
I-V-characteristics of partly shaded solar modules
Temperature coefficient of solar cells

Photovoltaic system experiments:
Components of an off-grid system

Possible operating conditions of off-grid systems
Working principle of shunt and series regulators
Comparison of PWM- and series regulator
Load characteristic of PWM regulators
Working principle of a MPP tracker
Characteristics of a MPP tracker
Working principle of deep discharge protection
Working principle of an inverter
Determination of the output voltage progression at an inverter

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

1100-04 Solar module 5.22 V, 380 mA:
solar module with 9 high efficiency polycrystalline solar cells
4.5 V open circuit voltage
820 mA short circuit current
3.75 Wp peak power
Optimized low light behaviour
Solar cell size 3 pcs. 52mmx52mm
Contacting via 4mm jacks
Module size: 200 mm x 200 mm

1118-05 Diode module Pro:

1118-04 Potentiometer module Pro:

1118-06 Shunt regulator module Pro:
Two-level shunt-regulator for charging capacitors or batteries
Input voltage: 2.5...5.5 V
Switching thresholds: 4.17 V; 3.64 V
Charge control LED
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

1118-02 Motor module Pro:

1118-01 Light bulb module Pro:

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 connectsion 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

1118-08 LED module (high brightness) Pro:
Super bright white LED as simulation of an LED-lamp for experiments concerning off-grid systems
Input voltage: 3 - 5.5 V
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

1118-07 Deep discharge protection module Pro:
Two-level deep discharge protection for experiments concerning charge regulation
Input voltage: 2.5 - 5.5 V
Switching thresholds: 3,16 V; 2,81 V
Control LED
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

1118-10 Series regulator module Pro:
Two-level series-regulator for charging capacitors or batteries
Input voltage: 2.5 - 5.5 V
Switching thresholds: 4.1 V; 3.49 V
Charge control LED
Layout: plug-in module with 4mm 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

1118-12 DC/ AC-Inverter Pro:
DC / AC inverter for experimental purposes
Input voltage: 2.5 - 5.5 V
Output: 4.5 V AC, frequency adjustable: 0.5 - 15 Hz

Layout: plug-in module with 4mm 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

1118-13 MPP-Tracker Pro:
MPP-Tracker (DC/DC inverter) for experimental purposes
Input voltage: 2.5 …5 V
Output voltage: 2.5 … 5 V, regulated to maximum output power
Two modes: automatic mode for finding the MPP automatically, manual mode for setting output voltage manually
Layout: plug-in module with 4mm jacks
3-terminal plug-in module for use in circuits with common ground
Grid-dimension of the jacks: 70mm
Module size: 85mmx85mm

1118-15 PWM regulator Pro:
Pulse width modulation charge regulator for experimental purposes
Input: 2.5 - 5.5 V
Output: voltage pulses (voltage = input voltage), pulse width regulated according to charging level of battery
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

1800-06 Resistor plug element 33 Ohm:

1800-04 Resistor plug element 100 Ohm:

1800-05 Resistor plug element 10 Ohm:

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

1800-01 Resistor module (triple) Pro:

1100-59 Lighting module (with safety sockets):

1118-17 Base for solar panel:

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**

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

L2-02-017 Propeller:

L3-01-074 Aluminium case PV Professional 1118:

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

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

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

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

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

L3-01-090 Insert PV Professional 1118:

L3-03-258 Info sheet initial startup:

L2-04-080 Lamp housing:

L2-04-093 Illuminant 80W:

L3-03-181 Layout diagram 1118 PV Professional:

Specifications extras needed:

No extras needed, all inclusive.

Specifications extras available:

L3-03-084 Anleitungsheft leXsolar-PV Professional:

L3-03-085 Experimentierhandbuch leXsolar-PV Professional:

L3-03-093 Instructions manual leXsolar-PV 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.

L3-03-097 Experiment handbook leXsolar-PV 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: