Product datasheet (en)

Version:	1905_10.05.2017

Photo:	Name:
	leXsolar-Hydropower Ready-to-go

Item number:

1905

Youtube link:

https://www.youtube.com/watch?v=lsvbzip4_qA&index=16&list=PLKckcQZwZt5xmSkC9p1Uh

Area of application:	Dimensions (cm x cm x cm)
Physics Technology Training Electrical Engineering Renewable Energies	

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

Key facts:

- Fast assembly by GARDENA plug system
- Various adapters for water-tap is include
- Observation of the functionality of the electrical generator during the operation
- Three different types of turbines
- Fundamentals of fluid dynamics

List of components:

1 x 1900-02 Water turbine casing
1 x 1900-03 Turbines set
1 x 1900-05 Manometer set 2 bar
1 x 1900-06 Manometer set 4 bar
1 x 1900-07 Intake connector
1 x 1900-08 Flow set 4 mm
1 x 1900-09 Flow set 8 mm
1 x 1900-10 Flow set 12 mm
1 x 1905-02 Induction generator 12 fold
1 x 9100-03 AV-Module
1 x 1100-26 Light bulb module
1 x 1400-08 LED-module 2mA, red
1 x 1100-25 Buzzer module
1 x 1100-27 Motor module without gear
1 x 1100-19 leXsolar-Base unit Large
1 x 1100-22 Resistor module
1 x 1900-11 Flow box
1 x 1100-28 Color discs - Set 1
1 x 1900-12 Connection set
1 x L3-01-202 Aluminium case PV Professional 1905
1 x L2-02-066 Water flow meter
2 x L2-05-131 Schlauchschelle
1 x L3-03-258 Info sheet initial startup
1 x L3-03-272 Einräumplan 1905 Hydropower Ready-to-go
0,2 x L2-02-062 Gewebeschlauch 12/18mm
1 x L2-06-014 Test lead black 50 cm
1 x L2-06-015 Test lead red 50 cm
1 x L2-06-012 Test lead black 25 cm
1 x L2-06-013 Test lead red 25 cm
1 x L2-05-135 Schlauchschelle mit Drehkopf und Sechskantschraube, Edelstahl
1 x L3-01-197 Container box 6 L
1 x L3-01-194 Insert HydroPower RtG 1905

Extras needed:

No extras needed, all included.

Extras available:

No extras available.

Description:

Besides qualitative experiments as introduction into the topic hydropower usage for high school students and basic experiments in technical training, this experimenting kit offers fundamental quantitative experiments on the physics of water turbines. A

foundation in reality enjoys, as with all leXsolar products, a high priority. leXsolar-Hydropower Ready-to-go is therefore equipped with different types of turbines - from a simple water wheel to a modern, highly efficient Pelton turbine

Experiments:

- Volume flow, flow velocity and power as a function of the height of fall
- Volume flow, flow velocity and power as a function of the pipe cross-section
- Comparison of the functionality of pelton turbine, crossflow turbine and waterwheel
- Comparison of the performance of the pelton turbine, crossflow turbine and waterwheel in dependence to the volume flow and pressure

Specifications of components

1900-02 Water turbine casing:
The turbine casing has 2 inflows and 1 outflow. The three different turbines of the turbine set can be inserted in the turbine casing.
The turbine set consists of water wheel, cross-flow and pelton turbine. While experimenting with water wheel and cross-flow turbine the upper inflow is used. Using the pelton turbine the water should be running through the lower inflow.

1900-03 Turbines set:
The turbine set consists of water wheel, cross-flow and pelton turbine. While experimenting with water wheel and cross-flow turbine the upper inflow is used. Using the pelton turbine the water should be running through the lower inflow.

1900-05 Manometer set 2 bar:
The manometer sets display the pressure the water has flowing into the turbine. The 4 bar manometer is installed on the lower inflow, the 2bar set on the upper inflow.

1900-06 Manometer set 4 bar:
The manometer sets display the pressure the water has flowing into the turbine. The 4 bar manometer is installed on the lower inflow, the 2bar set on the upper inflow.

1900-07 Intake connector:
The intake connector joins the upper and the lower inflow. Adjusting the valves, it can be controlled via which inflow the water should be provided.

1900-08 Flow set 4 mm:
The flow set consists of a 1m long hose with the inside diameter of 4mm and a connecting piece. With the connecting piece the flow set can be plugged to the bottom of the flow box. The valve on the connection cap is used to open and close the water inlet.
For marking the hight, every hose hase a O ring, which can be pulled to the required place.

1900-09 Flow set 8 mm:
The flow set consists of a 1m long hose with the inside diameter of 8mm and a connecting piece. With the connecting piece the flow set can be plugged to the bottom of the flow box. The valve on the connection cap is used to open and close the water

inlet.
For marking the hight, every hose hase a O ring, which can be pulled to the required place.

1900-10 Flow set 12 mm:
The flow set consists of a 1m long hose with the inside diameter of 12mm and a connecting piece. With the connecting piece the flow set can be plugged to the bottom of the flow box. The valve on the connection cap is used to open and close the water inlet.
For marking the hight, every hose hase a O ring, which can be pulled to the required place.

1905-02 Induction generator 12 fold:
A shaft conects the turbine with the white magnet disk on the outside of the casing. On top of it the induction generator can be attached. The generator is made out of coils, diodes and capacitors. Is the turbine spinning, the magnet disk is spinning as well. This causes a change in the magnetic field in the coils and a voltage is induced. The sinusoidal voltage is rectified by the diods and straightened by the capacitors.

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**

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

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

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

1100-27 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

1100-19 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

1100-22 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

1900-11 Flow box:
The Flow box has a drain where the flow sets can be plugged onto. It has an inclined bottom so the water can drain continuously.

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

1900-12 Connection set:
The Connection set has the function to connect the water turbine complex with the water supply in the house.
With one end he has to be adjusted on top of the water volumeter, the other end to a water supply.
The hose clamps fix and seal the hoses on the turbine casing. They are permanently mounted. The hose for the outflow is hold by a hose clamp with roary knob. When beginning the experiments, this clamp should be used to to turn the hose facing downwards.

L2-02-066 Water flow meter:

L3-03-258 Info sheet initial startup:

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.

L2-06-012 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.

L3-01-197 Container box 6 L:

L3-01-194 Insert HydroPower RtG 1905:

L3-01-202 Aluminium case PV Professional 1905:

Specifications extras needed:

No extras needed, all inclusive.

Specifications extras available:

No extras available.