

**Photovoltaik-
System
SUSE**

**Solarthermiesystem
Wärme von der Sonne**

innovative Solarsysteme für Schule und Ausbildung

11
102
004

Leibniz
Universität
Hannover



Begabungsförderung
in Hannover und Region
www.mint-hannover-region.de

BNE
Bildung für
Nachhaltige
Entwicklung

The NILS-ISFH suncatcher box for elementary schools

Complete experimentation system on photovoltaics, solar heat, and wind energy

Class set for experiments on 30 learning stations

Especially suitable for student-centered experimental classes for grades 3-6

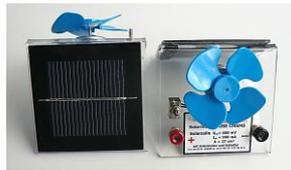
Hamelin's suncatcher box ES was developed at the learning workshop **NILS** of the institute for solar energy research **ISFH**. It contains a **complete student-centered experimentation system on solar energy in a classroom set of learning stations**.

With the solar didactic concept developed by **NILS-ISFH** with complete experimentation manuals the suncatcher box can be used for classroom experiments and school projects. With the acquisition of the suncatcher box an **advanced training for teachers** (4 hrs.) at the school or at the ISFH is included.

The experiments can be conducted outside in the sunlight or in the classroom with halogen lamps.

Contents of a suncatcher box:

8 solar modules SUSE CM6MS



8 solar modules CM6B



1 solar module SUSE 4.3 RB
with 6 solar cells in pluggable series
connection



2 solar thermal collector GS
with 2 selective absorbers, black+silver

2 digital thermometers



8 digital multimeters with 2 measurement cables



Modell kann variieren

2 solar radiation meters SUSE 4.24A



2 solar- radios SUSE 4.36 to be connected to solar modules in series connection
1x mit SUSE 4.36 mit Büschelstecker, 1x SUSE 4.36 USB mit USB-A-Stecker für Solarmodul SUSE 4.50-10



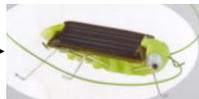
2 LED modules (1x red, 1x rainbow)



2 solar cars (solar racer construction kits)



1 solar cricket



1 solar energy storage module SUSE 4.12



8 solar motors with propeller SUSE 4.16



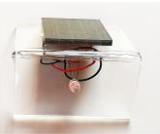
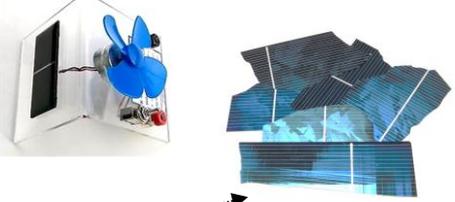
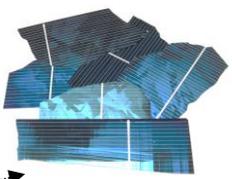
- 3 batteries 1,5 V 
- 1 solar helicopter (connector system) 
- 2 solar vehicles: SUSE SF1.2 for operation with the solar modules SUSE 4.3RB/CM6 and SUSE SF6USB for operation with the solar module SUSE 4.50-10 

- 28 lab wires mit 2x 4mm- bunch plugs (14x red, 14x black, 0,5 m in length) 
- 1 wind energy installation mit 3 LEDs 

- 1 solar butterfly- set 
- 2 test tubes for collector experiments 100mm x 10mm 
- 1 experimentation set 6in1 6 models with 1 solar cell 

- 1 10W- solar module SUSE 4.50-10GS with USB output +2 USB cables 
- 1 LED lamp with USB plug 
- 2 compasses 
- 2 stopwatches modell can vary 

- 2 folding rules 2m 
- 10 metal connectors for series connection with SUSE CM6B 

- 1 solar module SUSE CM315 
- 2 solar modules SUSE CM400, LED red + green 
- 1 solar didactic handbook > 120 pages on the suncatcherbox GS with complete manuals and solutions for 30 learning stations, print out in spiral binding and on DVD 

- 1 box of functioning solar cell fragments for experiments
- 1 training voucher for schools/institutions outside of lower saxony the travel expenses for the consultant have to be borne

For experiments in the classroom, 8 white glowing 120W halogen spot lamps with handles (from the hardware store) or red light lamps and 8 desk power sockets with switch are required. Not included in delivery!

White LED spot lights are not suitable because of the "wrong" light spectrum. As an alternative, 100-150W red light lamps are also suitable, because solar cells are especially sensitive to red light.



The 30 learning stations of the suncatcher box GS

For each learning station there is an extensive manual in the handbook/on the DVD for the students as well as for the teachers with didactic/methodical notes and solutions.

No.	Experiment	Required devices plus indoors: halogen spot light
1	Experiments with the solar vehicle solar racer	Solar racer, folding rule, stopwatch
2	How does a solar cell perform best?	Solar module SUSE CM6MS, multimeter, lab wires
3	Who measures the highest current?	Solar module SUSE CM6MS, multimeter, lab wires
4	Comparison solar cell vs. battery	Solar module SUSE CM6MS, multimeter, mignon battery, lab wires
5	Series connection of batteries	Multimeter, mignon batteries, lab wires
6	Series connection of solar cells	Solar module SUSE CM6B, multimeter, lab wires
7	Operation of a radio with solar modules in series connection	Solar module SUSE CM6B, solar radio SUSE 4.36, lab wires
8	Operation of a radio with the solar module SUSE 4.3RB	Solar module SUSE 4.3RB, solar radio SUSE 4.36, multimeter
9	Storage of solar current, LED module	Solar module SUSE CM6B, lab wires, solar storage SUSE 4.12, LED module SUSE 4.15 rainbow
10	Storage of solar current, solar motor	Solar module SUSE CM6B, solar storage SUSE 4.12, solar motor SUSE 4.16, lab wires
11	Solar car with solar charging station	Solar module SUSE 4.3RB, SUSE solar vehicle 1.2, lab wires
12	When does the rainbow LED glow?	Solar module SUSE 4.3RB, LED module SUSE 4.15 rainbow, lab wires, multimeter
13	Which air screw rotates the fastest?	Solar module SUSE 4.3RB, solar motors SUSE 4.16, lab wires, multimeter
14	How many solar motors can a solar cell fuel?	Solar module SUSE CM6B, solar motors SUSE 4.16, lab wires, multimeter
15	Changing the solar cell area by covering	Solar module SUSE CM6B, multimeter, lab wires
16	Positioning of a solar cell in different cardinal directions	Solar module SUSE CM6B, multimeter, compass, lab wires
17	Experiments with the solar radiation meter	Solar radiation meter SUSE 4.24, compass
18	Experiments with solar cell fragments	Solar cell fragments, solar motor SUSE 4.16, lab wires, multimeter
19	Who measures the highest current with a solar cell fragment?	Solar cell fragments, multimeter, lab wires
20	The solar motor as a wind power plant	Solar motors SUSE 4.16, multimeter, lab wires
21	Wind power lets the LED glow	Solar motor SUSE 4.16, LED module SUSE 4.15, lab wires
22	Solar toys	Solar toys 6in1, solar butterfly, solar helicopter
23	Experiments with the thermometer	Digital thermometer

24	Experiments with the solar thermal collectors	Digital thermometers, solar thermal collectors
25	Heating of water in the solar thermal collector	Digital thermometers, solar thermal collector, test tube, water
26	Charging a phone with solar energy at the solar module SUSE 4.50-10GS and charging powerbank battery packs	Solar module SUSE 4.50-10, smartphone with USB charging cable, powerbank battery pack
27	Solar module SUSE 4.50-10 as a solar charging station	Solar module SUSE 4.50-10, solar vehicle SF6USB, USB cable (2x plug USB A)
28	Operating a radio and LED lamp at the solar module SUSE 4.50-10	Solar module SUSE 4.50-10, solar radio SUSE 4.36 USB, LED lamp with USB plug
29	Comparative experiments with big and small solar cells	Solar module SUSE CM6MS, solar module SUSE CM315, multimeter, 2 lab wires
30	Discover your own experiments with the solar module SUSE CM400	Solar module SUSE CM400 red/green

If there is no need for the whole suncatcher box, we can also prepare offers for single learning stations, please request an offer via info@sundidactics.de .

Among the scope of delivery there is an advanced training course for teachers with a duration of approx. 4 periods at the ISFH or at the school, at which the suncatcher box is to be used.

A voucher for an advanced training of 4 hours is part of the suncatcher box.

The topics of the advanced training for teachers at elementary schools:

- **Solar energy as part of the energy revolution globally, in Europe, and Germany**
- **The sun as a sustainable and infinite energy source for humankind**
- **Basics of solar energy, photovoltaics, solar heat**
- **Current from solar radiation: composition and function of solar cells**
- **Current from solar radiation: composition and function of solar modules**
- **Heat energy from solar radiation: composition and function of solar thermal collectors**
- **Presentation and explanation of the experimentation devices in the suncatcher box**
- **Electric mobility with experiments of the suncatcher box**
- **Conduction of the experiments of the 30 learning stations by participants of the course**
- **Didactic concept of the suncatcher box GS in regards to STEM and ESD**
- **Didactic/methodical planning of the use of the suncatcher box at the school**

The teachers' training is part of the suncatcher box and is free of fees.

Travel expenses in the state of Lower Saxony are borne by the state/the ISFH.

Teacher's trainings outside of the state of Lower Saxony require the absorption of travel expenses for the NILS-ISFH consultant according to BRKG.

Optimal is the conduction of the experiments outdoors in natural sunlight/daylight in bright sunshine or with a clouded sky.

Good light sources for experiments indoors/in the classroom are:

Halogen spot light 120W (portable floodlight) with pipe foot and handle with switchable desk power socket

Red light lamps 100- 150 W (as used in curing a common cold)

Overhead projectors, on the glass plate experiments can be conducted outstandingly

Shipping and billing services are handled by our vendor **Sundidactics**

www.sundidactics.de info@sundidactics.de +49 (0)175 7660607 (mobile, W.R. Schanz)