IKS Photovoltaik

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SOLARTRAINER *junior*

IKS Photovoltaik

Photovoltaic-experimental kit for teaching at schools

The available experimental materials allow the carrying out of all basic experiments in the field of photovoltaics.
Because the experiments are built up modularly the adaption to the actual teaching is possible according to the requirement.

The materials are arranged clearly and optically attractive in a specific yellow suitcase. Everything is always completely at hand, extra material is not necessary.
The experiments can be built up and removed fast.
The pupils are able to carry out the experiments by themselves with the help of the easily understandable experimentation instruction.
The teacher gets further information to do the exercises and to understand the physics.

Development supported financially by the German Federal Ministry for education, science, research and technology. Identification-number 0329841C

Picture is showing optional extra

With the set of equipment supplied, the following experiments are possible:

- Measuring of the irradiance of different light sources
- Solar cell as an energy converter
- Solar cell as an energy converter and diode function
- Open circuit voltage of a solar cell at different shadowing conditions
- Short circuit current of a solar cell at different shadowing conditions
- Open circuit voltage and short circuit current of a solar cell at different irradiance
- Short circuit current of a solar cell depending on angle of incidence of the light
- Series connection of solar cells / different shadowing conditions / bypass diode
- Parallel connection of solar cells / different shadowing conditions
- Characteristic curve of a solar cell (I/U) / different irradiance
- Characteristic curve of a solar cell (U/P), MPP, figure out of the efficiency
- Simulation: Short circuit current of a solar cell depending on position of the sun (sunrise to sunset)
- Charging a GoldCap / accumulator with solar cells
- Discharging a GoldCap / accumulator with electric motor and light bulb
- Building up of a stand alone operation net

With extension kit - measurement with PC:

- Characteristic curve of a solar cell (I/U) / different irradiance
- Demonstration of an inverter (sinwave / rectangular)
- Charging a GoldCap / accumulator with solar cells, discharging a GoldCap / accumulator with electric motor and light bulb

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Dimmable halogen light (low voltage 12 V) which can be moved around the solar module in a semicircle, disconnectable for experiments with sun light

Solar module with 4 single solar cells and angle adjustment. Integrated power supply in the basic housing

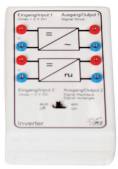
Basic board with frame to put the experimental boxes und multimeters

Set of equipment supplied:

- Specific yellow suitcase with shaped part made of foam plastic
- Basic board with frame to put the experimental boxes und multimeters
- Low voltage (12 V) halogen lamp
- Power supply with dimmer switch, power cable (mains fed, input 230 V AC 50 Hz, output 12 V AC)
- Solar module with 4 single cells and angle adjustment
- 2 multimeters with 2 mm connectors
- Sensor box for measuring irradiance
- Load box with electric motor and light bulb
- Storage box with NC accumulator and GoldCap and blocking diode
- Measuring box with variable resistor
- Connecting cords, high flexible, contacts brass / hard copper gold plated
- Experimental instruction / Experimental solutions / Professional informations

Optional extension kit:

- PC measuring box
  Inverter box
  Interface cable RS 232/ USB converter
  Software (running under WINDOWS)



Subjekt to alteration. Pictures additionally are showing partially optional extra. State: 2014-06

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Measurement engineering
Special developments

Reseller

WINDTRAINER junior

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Windenergy-experimental kit for teaching at schools

The available experimental materials allow the carrying out of all basic experiments in the field of windenergy.
Because the experiments are built up modularly the adaption to the actual teaching is possible according to the requirement.

The materials are arranged clearly and optically attractive in a specific with suitcase. Everything is always completely at hand, extra material is not necessary.
The experiments can be built up and removed fast. The pupils are able to carry out the experiments by themselves with the help of the easily understandable experimentation instruction. The teacher gets further information to do the exercises und to understand the physics.

Picture is showing optional extra

With the set of equipment supplied, the following experiments are possible:

- Measuring of the wind force in the vicinity of the school
- Measuring of the wind force of the wind machine dending on the adjustment of the control knob
- Power output of the generator depending on the shape of the wing (even / curved)
- Power output of the generator depending on the number of wings (2, 3 , 4)
- Power output of the generator depending on the position (angle) of the wing
- Characteristic curve of a generator (U/I) at constant speed
- Characteristic curve of a generator (U/I). Measuring the resistance- and buoyancy rotor at constant wind force
- Power output of the generator depending on the wind force
- Charge of an akku/Gold Cap with the generator
- Discharge an akku/Gold Cap with different loads
- Build up of a stand alone operation net

With extension kit savonius rotor:

- Characteristic curve of a savonius rotor(U/I) at constant speed
- Power output of the savonius rotor operating with and without aperture

WINDTRAINER junior

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Wind power plant with protection cover and degree scale

Controllable wind machine (low voltage)

Anemometer

Basic board with frame to put the experimental boxes und multimeters

Accessories and tool

Set of equipment supplied:

- Specific white suitcase with shaped part made of foam plastic
- Basic board with frame to put the experimental boxes und multimeters
- Wind machine with controllable power supply
- Wind power plant with axial rotor, generator without gear, with tacho generator, hub for mounting 2, 3, and 4 wings, angle of the wings adjustable
- 4 wings even, 4 wings curved
- Protection cover, wind shield, tool
- 2 multimeters with 2 mm connectors
- Anemometer
- Load box with electric motor and light bulb
- Storage box with NC accumulator and GoldCap and blocking diode
- Measuring box with variable resistor
- Experimental instruction / experimental solutions / professional informations/CD

Optional extension kit:

- Savonius-Rotor

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H_2-TRAINER junior

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Hydrogen-/ Fuel Cell-experimental kit for teaching at schools

The available experimental materials allow the carrying out of all basic experiments in the field of hydrogen-/ fuel cell technology.
Because the experiments are built up modularly the adaption to the actual teaching is possible according to the requirement.

The materials are arranged clearly and optically attractive in a specific red suitcase. Everything is always completely at hand, extra material is not necessary.
The experiments can be built up and removed fast.
The pupils are able to carry out the experiments by themselves with the help of the easily understandable experimentation instruction.
The teacher gets further information to do the exercises and to understand the physics.

With the set of equipment supplied, the following experiments are possible:

- Measuring of the volume ratio of the generated gases
- Measuring of the generated volumes of the gases per unit of time depending on the current
- Determination of the power effiency and the Faraday efficiency of the elektrolyser
- Determination of the U/I- characteristic of the elektrolyser
- Determination of the power effiency and the Faraday efficiency of the fuel cell
- Determination of the U/I- characteristic of the fuel cell
- Building up of a stand alone operation net
- In combination with the Solartrainer junior: Operation of the elektrolyser with solar cells
- In combination with the Windtrainer junior: Operation of the elektrolyser with windenergy
- In combination with the Solartrainer junior and the Windtrainer junior: Operation of the elektrolyser with solar cells and windenergy as a hybrid system

H_2-TRAINER *junior*

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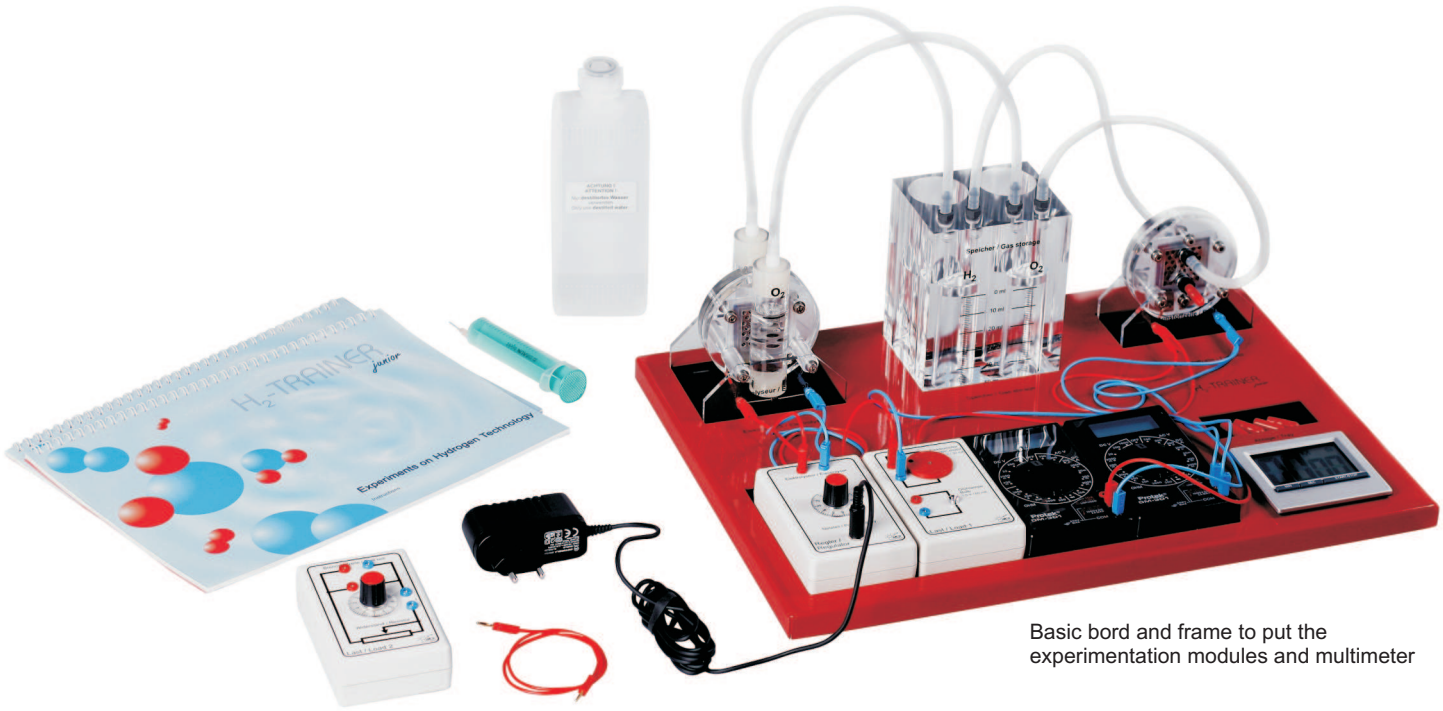

Elektrolyser, gas storage and fuel cell

Basic bord and frame to put the experimentation modules and multimeter

Power supply and accessory

Set of equipment supplied:

- Specific red suitcase with shaped part made of foam plastic
- Basic board with frame to put the experimental boxes und multimeters
- Elektrolyser
- Power supply
- Current control box
- Gas storage
- Fuel cell
- 2 multimeters with 2 mm connectors
- Load box with electric motor and light bulb
- Measuring box with variable resistor
- Connecting cords, highly flexible, contacts brass/hard copper gold plated
- Connecting hoses/caps
- Destilled water
- Syringe
- Experimental instructions / Experimental solutions

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Energie Check junior

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Measurement equipment

For projects at schools the ideal measurement equipment to deal with energy-saving, room-air condition, water consumption, room lighting and energy consumption of electrical appliances.

The measurement devices are arranged clearly and optically attractive in a specific green suitcase. Everything is always completely at hand, extra material is not necessary.
With the set of equipment supplied, the following measurements are possible:

Room air quality

With the two digital temperature-humidity-meters the relative air humidity and the air temperature can be measured.
The measured values are displayed on a LCD-display, it is also possible to log the datas.
With the relative air humidity and the air temperature it is possible to determine the dew point temperature.
The data can be read out by the RS-232 -interface with the enclosed software.

Surface temperature

With the digital precision temperature meter it is possible to measure surface temperatures, water and air temperatures.
The wall temperature can be inspected of critical dew point temperatures (mildew potential).

Indoor and outdoor temperatures

With the two digital temperature meters the indoor and outdoor temperatures can be measured just as the min. And max. Values.

With the two analog temperature meters the air temperature and the min. and max. values can be measured.

Illuminance level

With the lux meter class-rooms and laboratory areas can be inspected of adequate and evenly distributed illuminance level - which is prerequisite for a non fatigue seeing.
This way it is possible to detect deficiencies and wasteful illumination can be avoided.

Water consumption

With the flow rate meter the water consumption at every spigot can be determined.

Energy consumption of electrical appliances

With the energy meter the energy consumption of electrical appliances can be determined as well as the energy costs.

Energie Check *junior*

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Content

1 Lux meter digital
Effective range 0 - 50,000 Lux,
value-hold-function, sensor
external with spiral cable.
Metering precision +/- 5% + 2
digits

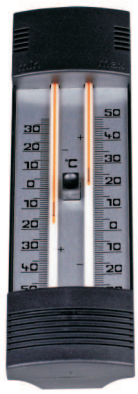
2 Temperature humidity meters digital
Effective range temperatur:
0 .. + 59.9° C,
Metering precision +/- 0.5 °C
Effective range relative air
humidity: 1 .. 99 %
Metering precision +/- 3%
Time (DCF-77 signal)
Min.-/ Max.- values
Preset of alarm values possible
Average values
Dew point temperature
Big digital-LCD-display,
Data logger, up to 3,000 values,
memory, time interval selectable
RS 232-interface
Foot to put up
2 Interface cables
Software to read out, data export
and processing with other soft-
ware possible

1 Precision digital thermometer
External sensor for measuring of
surface, water and air temperatu-
res.
Effective range -199.9 ..+199.9 C°,
Resolution 0.1° C
Precision 0...100° C: 0.1°C +/- 1
digit

2 Enery cost meters digital
Measuring of energy, power
(Effective power), voltage,
measuring duration, duty cycle,
costs, min. / max. values, cost
prognosis and more features

2 Indoor-/ outdoor tempe-rature meters digital
External sensor for measuring the
outdoor temperature,
Cable length 3 m
Effective range indoor temp.
-10 ...+60° C
Effective range outdoor temp.
-50 ...+70° C
Min- / Max. - values
Big digital-LCD-display

1 Flow rate meter
Effective range 1 to 25 l/min,
actual value can be read off
directly on the scale



2 Indoor temperature meters analog
Effective range -35 ...+50° C
Min- / Max. - values, reset

1 Instructions
1 Solutions
1 Professional informations

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