2 Solar Energy

Experiment 1- How to determine measurement values of the photovoltaic system with changes of the position	
Summary	In this experiment the power is observed with different alignment and installation angles of the photovoltaic system. The different alignment angles of the solar modules are -30°, 30° and 0°. The different installation angles of the solar modules are 15°, 30° and 45°. In the process, differences between of one and two-axis tracking in comparison with stationary photovoltaic systems can be recognized.
Worksheet	Table for entering the measurement data. Findings for the measurements.
Checklist	• There is a sufficient amount of sunlight (in heavily overcast weather the experiment does not work properly)

Experiment 2 - Conversion losses with the charging and discharging of batteries	
Summary	On the basis of various configurations, the experiment shows that the storage of energy is always fraught with losses and that the charging and discharging of batteries always means losses in the form of heat losses. The solar modules are used as a regenerative energy source in the experiment.
Worksheet	Table for entering measurements. Findings for the measurements.
Checklist	• The battery may not be fully charged. Discharge the battery for one hour with approx. 10 A discharge current • Electronic load (power consumption variable) can be replaced with a lamp with dimmer, resistor decade, etc. • There is a sufficient amount of sunlight (in heavily overcast weather the experiment is pointless) • Stop watch
TIP	This experiment is only logical if the load can be adjusted to different power consumptiors. The load must be adjusted so that it is fed directly from the solar modules. This is the only way the difference between the discharge of the battery and solar module can be seen. The DATA LOGGING is helpful with this experiment.

Experiment 3 - How to test day and night profiles	
Summary	Situations for day and night are simulated in this experiment.
Worksheet	Table for entering the measurement data. Findings for the measurements.
Duration:	approx. 90 minutes
Checklist	• There is a sufficient amount of sunlight (in heavily overcast weather the experiment is pointless) • Stop watch • Calculator

3 Hydrogen

Experiment 4 - How to calculate the degree of efficiency of an electrolyzer	
Summary	The energetic degree of efficiency of an electrolyzer is calculated in this experiment.
Topic Worksheet	General questions and calculations for the degree of efficiency of an electrolyzer
Previous knowledge	• Recording of measurement curves • Work with electrolyzers • Calculating with multiple physical units
Checklist	• Electrolyzer • Stop watch • 5 liters distilled water
TIP	In this experiment students should independently determine the physical sizes required for the calculation.

Heliocentris Academia International GmbH
Rudower Chaussee 30, 12489 Berlin, Germany
www.heliocentrisacademia.com