SUNdidactics
SolarEnergyDidactics
SolarEducation
SolarEngineering
Photovoltaics+Solarthermal
innovative Solarsysteme für Schule und Ausbildung
innovative solar- systems for school, college, technical education

NILS ISFH
Vertrieb
Auslieferung
Rechnungsservice
Solartechnik
Solardidaktik
Solare
Wissenschaft

Photovoltaik-System
SUSE
Solartechnik
Experimentiergeräte
Solare Experimente
von der Grundschule
bis zum Abitur

BNE
Bildung für nachhaltige Entwicklung
Education for Sustainable Development

Solardidactic – Solarzellen - Solarmodule – PV- Experimentiergeräte – Solarthermie -Experimentieranleitungen
Solarspielzeug - didaktische Konzepte – Solarberatung – Fortbildung - solare Aus- und Weiterbildung
Solardidactics + solar cells + solar modules + photovoltaic experiment devices + solar toys + solar education and training

SUNdidactics Solar Systems

Phone: +49(0)5121 860730 Fax: +49(0)3222 3706689 Mail: info@sundidactics.de Mobile:+49(0)1757660607 web: www.sundidactics.de

Condensed experimentation manual

with the solar module SUSE CM330 + solar vehicle SUSE solar runabout turboST

QR experiments

Name:.....**School:**.....**Date:**.....

After you finished building the solar module and tested it, you can conduct some experiments on photovoltaics with the solar module SUSE CM330 and the SUSE solar runabout turboST, using this condensed manual.

1. Determining the electric voltage, current, power of the solar module with measurements

You need a multimeter with 2 lab wires (red + black) for this, as well as the basic device SUSE 4.0 (halogen spot lamp 120W) and an overhead projector.

Settings of the multimeter for measuring the voltage: 20V DC, black negative wire in socket 'com', red positive wire in socket 'V', for measuring the current: 10A DC, black negative wire in socket 'com', red positive wire in socket '10A' (indoors use measurement range 20 mA DC). Plug the red wire into the red socket at the solar module, the black wire into the black socket.

Measurement location	**Voltage V in V**	**Short-circuit current I in A**	**Power P in W** P = V*I*0,8
On glass plate (centered) of the overhead projector			
40 cm in front of halogen spot lamp 120W			
Outdoors, bright sunshine			
Outdoors, clouded sky			
Indoors with normal room illumination			

What do you notice? Note your observations on the measurements and the rotational speed of the motor, as well as other ideas for analysis here:

2. Determining the irradiance (light intensity) of the light

You need a **multimeter in the measurement range 10A DC** with 2 lab wires (red + black) for this.
Black negative wire into the socket 'com', red positive wire into the socket '10A DC'.

The intensity of the light (= irradiance S in W/m²) can be determined by measuring the short-circuit current, because that is directly proportional to the irradiance. With this equation, S can be calculated from the short-circuit current:

Measurement location	Short-circuit current I in A	Irradiance S in W/m²
On glass plate (centered) of the overhead projector		
Outdoors in the sunshine, directed towards the sun		
Outdoors with a clouded sky, directed southward		
Outdoors in the shade		

$$S = \frac{\mathbf{I} \text{ in A} * \mathbf{1000}}{\mathbf{0{,}48} \text{ A}} \text{ W/m}^2$$

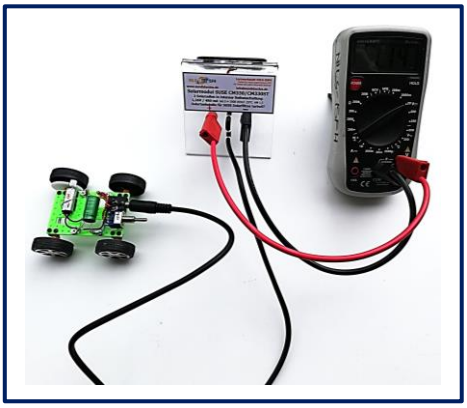
0,48 A is the short-circuit current of the solar cell at S = 1000W/m²

Note your observations and evaluations here:

3. Charging the storage capacitor on the SUSE solar runabout turboST

You need a multimeter in the measurement range 20V DC with 2 lab wires (red + black) for this, put the switch on the vehicle on "OFF" (central position). Before beginning the measurements, the capacitor needs to be discharged, briefly connect the two soldering eyelets of the capacitor to a metal item, e.g. a screwdriver.

Now plug the charging cable of the solar module into the vehicle's socket, make sure the switch is on "OFF"! Plug the two wires of the multimeter into the red-black socket pair at the module (see photo on the right). Adjust the module towards the sun or towards the light source for experiments indoors. Put the switch on "CHARGE" and observe the multimeter's display. In a second measurement you can read out the display every 10 seconds and note the values in the table:



Measuring setup for experiment 3

Time in s From the start	**0**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
Voltage in V										

If interested, you can also plot the charging curve with Excel or on mm paper!

Note your observations and evaluations here: