Leseprobe

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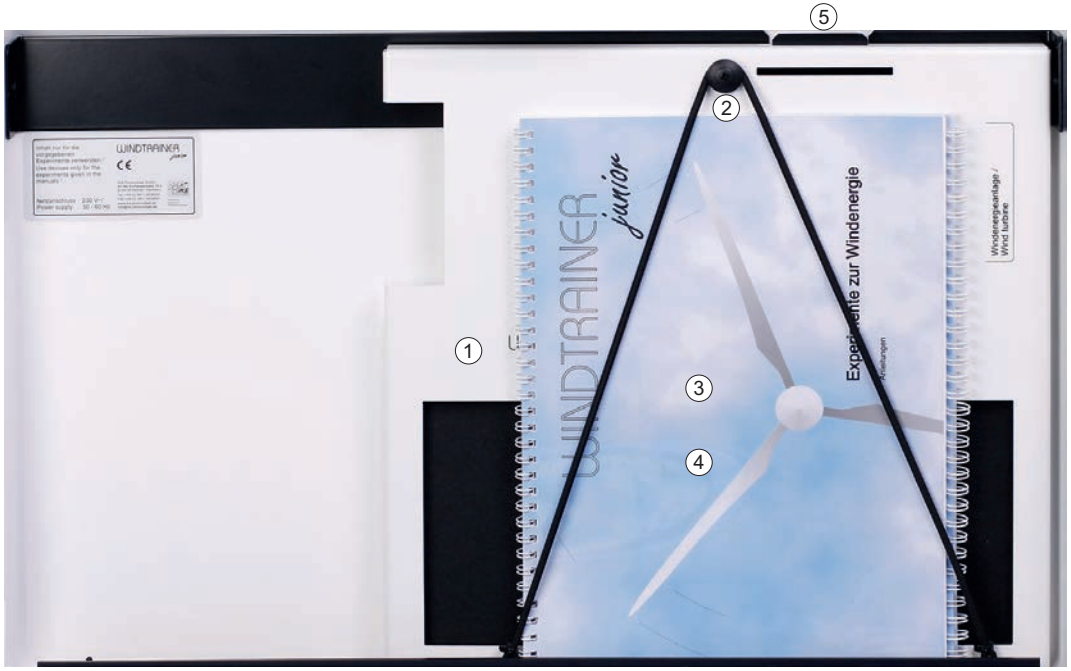
Contents and arrangement within the box



1. Base plate
2. Support button for shirr (booklet fixation)
3. Instructions
4. Solutions
5. Support for base plate

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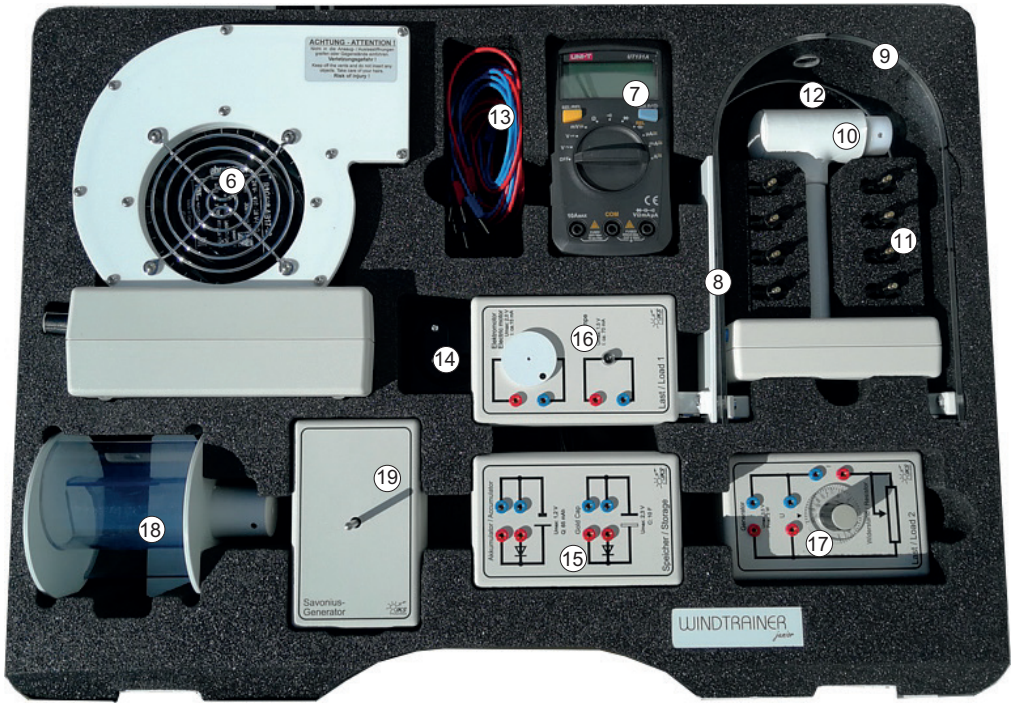

6 Wind machine
7 2 multimeters (1x bottom)
8 Wind bezel
9 Protective hood
10 Wind energy plant, axial
11 8 blades, 4x straight, 4x convex
12 Screwdriver (bottom)
13 8 measuring cables, 4x red, 4x blue
14 Wall plug transformer (DC cable below storage)
15 Storage
16 Load 1 (consumer module)
17 Load 2
18 Savonius generator with interchangeable bezel
19 Savonius generator, bottom part

Foam upholstery for covering the components (in the box lid, no figure)

Contents and arrangement within the box

1

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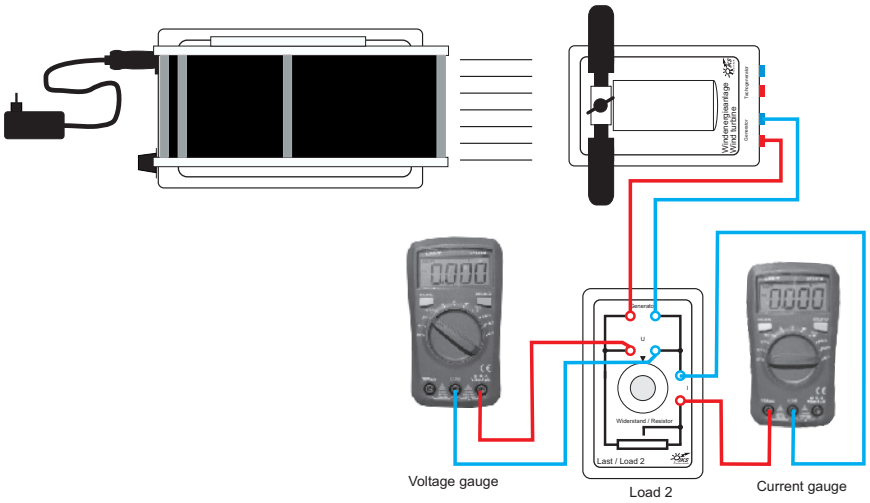
Measuring the output of a wind energy plant depending on the blade shape

Experiment 2

Set-up



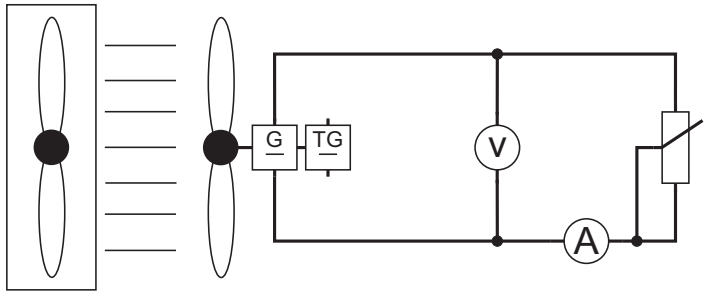
Information

This is one of the easier experiments in terms of the way it is carried out. Its only difficulty arises at the point when the convex blades are to be mounted in an opposing manner. In this case, the symbols on the adjustment rosette of the protective hood are helpful.

The results of this easy experiment are remarkable, however. Initially, the fact that the convex blades, as expected, experience more uplift than the level blades can be seen when looking at the increased performance.
If you mount one of the convex blades in an opposing manner, the additional lift is neutralised and you will obtain roughly the result you observed for the level blades.

Such a result virtually requires the examination of the drive mechanism on the blades of a wind energy plant, both from a practical and theoretical point of view.

Wiring diagram



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Information

Over the course of the development of wind turbines, different blade shapes have been used for the converter.

This experiment is designed to determine the influence of the blade shape on the operating behaviour.

Assignment

Set up the experiment according to the figure shown above. Use a wind turbine lift type with two blades.

The range selector switch of the multimeter voltage must be set to position **V ⎓ (DC)**, the switch of the multimeter current must be set to position **A ⎓ (DC)**.
For the load, the resistance of the **load 2** (with the multimeter in the Ω range) set to a value of **50 Ω**. Three measurements with two blade shapes will be taken in total.

Initially, mount the level blades with an angle of incidence of **60°**. On the potentiometer of the wind machine, set a wind speed of **8m/s**. For this, use the graph from **experiment 2**.

Measure the voltage and the current intensity of the wind energy plant and calculate the output.

Take the same measurement with the convex blades. In this, the cove must be aligned with the symbols specified on the angular rosette of the protective hood (normal).

Finally, the measurement is repeated, for which the convex blade is rotated by **180°** so that the cove is on the opposite side of the specified symbols (opposing).

All measurements are documented in a table. The output P is calculated from the product of voltage and current intensity.

Settings:

Wind energy plant principle:	Uplift
Number of blades:	2
Blade shape:	level / convex
Angle of incidence:	60°
Wind speed:	8 m/s
Load resistance:	50 Ω

	1. Blade	2. Blade	V (V)	I (mA)	P (mW)
level blade					
convex blade (normal)					
convex blade (opposing)					

1. Compare the first and the second measurements. Which blade shape achieves the higher output? Why?

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2. Compare the third measurement to the two previous measurements. Justify the result.

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