Influence of wind speed

Task and equipment

Information for teachers

Additional information

The adjusting knob for the current intensity must be completely turned to the right, so that a supply voltage of 12 V can be reached for the blower.

Attention!
It is important to ensure that the students always stand behind the blower and do not place their hands into the space between the blower and the wind wheel, when a voltage is applied on the blower and it turns the wind wheel.

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Task and equipment

Task

What influence does the wind speed have on the voltage produced by a wind wheel?

In this experiment a wind wheel is set up at various distances from the blower. The wind that reaches the wind wheel has different speeds. Measure the voltage that the wind wheel produces at different distances from the blower.
Repeat the experiment setting different supply voltages for the blower.

Student's Sheet

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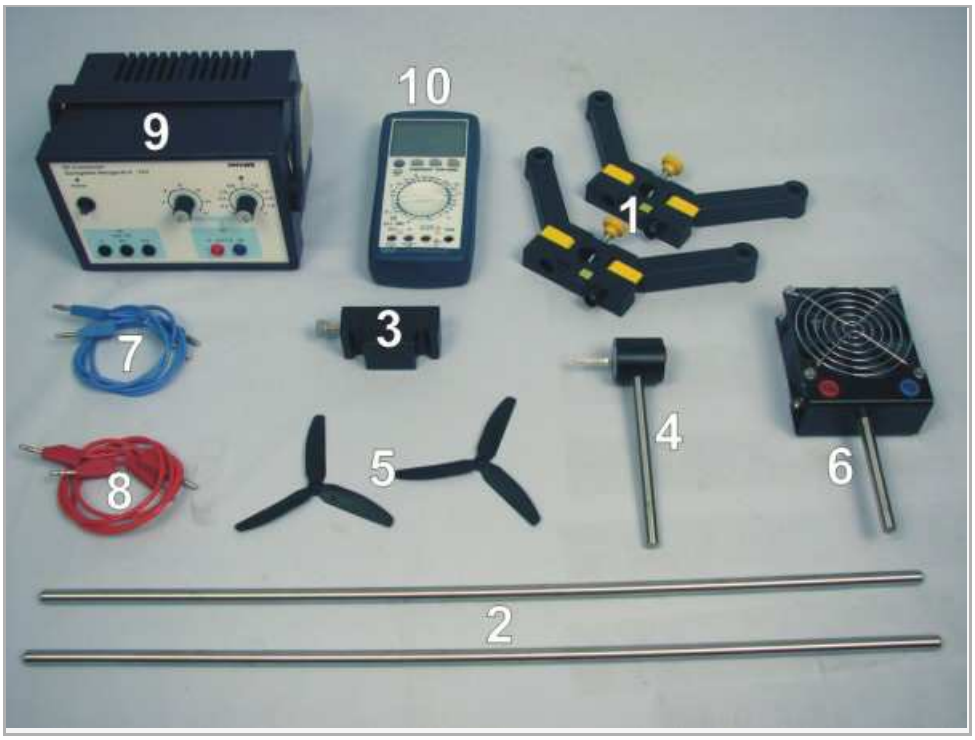
Equipment



Position No.	Material	Order No.	Quantity
1	Support base, variable	02001-00	1
2	Support rod, stainless steel, l = 600 mm, d = 10 mm	02037-00	2
3	Slide mount for optical bench	09822-00	1
4	Generator with metrical thread axis and nut	05751-01	1
5	Rotor, 2 pieces	05752-01	1
6	Blower, 12V	05750-00	1
7	Connecting cord, 32 A, 500 mm, blue	07361-04	2
8	Connecting cord, 32 A, 500 mm, red	07361-01	2
9	PHYWE power supply DC: 0...12 V, 2 A / AC: 6 V, 12 V, 5 A	13505-93	1
10	DMM with NiCr-Ni thermo couple	07122-00	1

Set-up and procedure

Set-up

Set up the optical bench using the variable tripod foot and both support rods (Fig. 1 and Fig. 2).

Fig. 1

Fig. 2

Fix the blower on the left of the tripod foot so that the side with the connection sockets faces away from the optical bench (Fig. 3).

Fig. 3

Put both rotors one after another on the axis of the generator (Fig. 4). The six blades should be equidistant to each other (Fig. 5).

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Fig. 4

Fig. 5

Fix the generator to the rider and put it on the optical bench (Fig. 6).

Fig. 6

Connect the AC adapter to the blower. The fan has to be connected to the outputs for direct current voltage (Fig. 7).

Fig. 7

Connect the measurement device to the generator (Fig. 8) and set up the measuring range to 20 V.

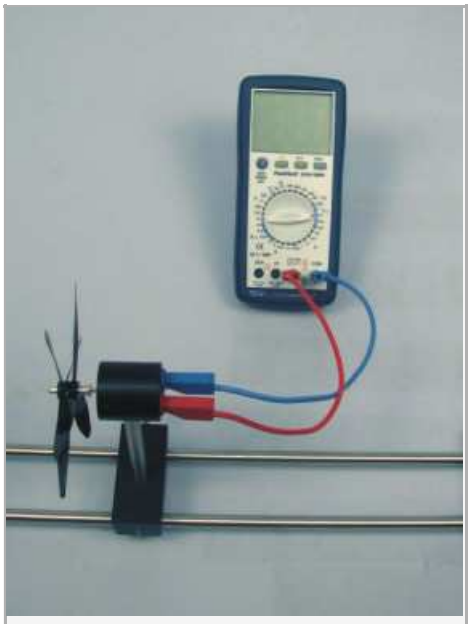

Fig. 8

Procedure

Move the generator in such a way that the distance between the front of the fan and the tip of the generator is about 5 cm (Fig. 9).

Fig. 9

Switch on the power supply and turn the adjusting knob for the intensity of current completely to the right. Turn the adjusting knob for the voltage to 12 V (Fig. 10).

Fig. 10

Write down in Table 1 the voltage indicated by the multimeter.

Switch off the power supply.

Move the generator 5 cm away from the blower, so that the distance is now 10 cm.

Turn on the power supply anew and measure the tension again. Write down the results in Table 1 in the report.

Repeat the process for the distances of 15 cm, 20 cm, 25 cm and 30 cm.

Now turn the adjusting knob for the voltage to 10 V, 8 V and 6 V successively and repeat the measurements at different distances.

Write down your results in Table 1.

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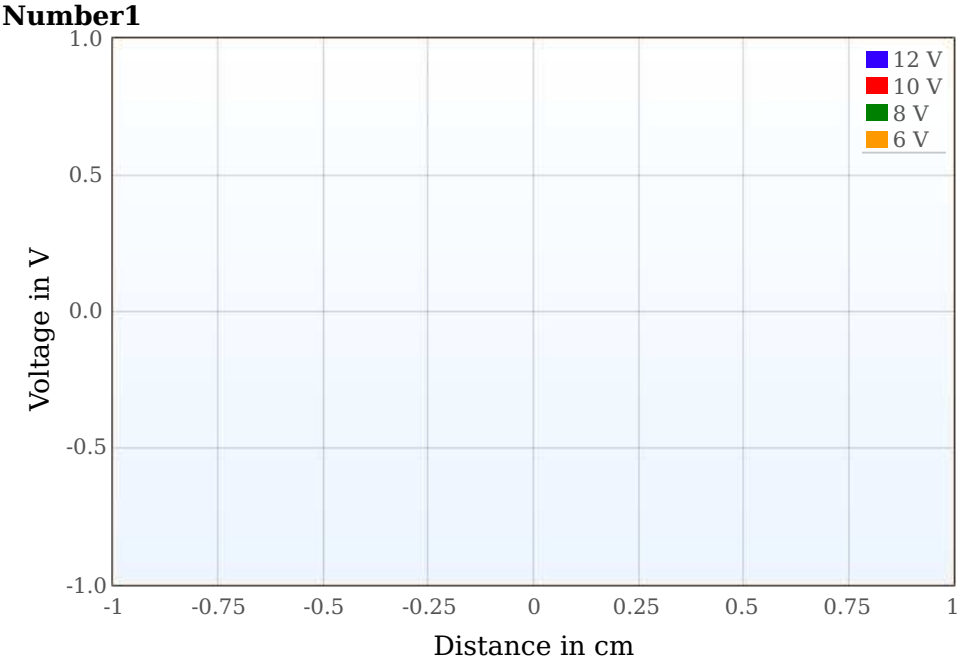
Report: Influence of wind speed

Result - Table 1

Note your measured values in the table.

Supply voltage:	12 V	10 V	8 V	6 V
Distance in cm	Voltage in V	Voltage in V	Voltage in V	Voltage in V
5	1 ±0	1 ±0	1 ±0	1 ±0
10	1 ±0	1 ±0	1 ±0	1 ±0
15	1 ±0	1 ±0	1 ±0	1 ±0
20	1 ±0	1 ±0	1 ±0	1 ±0
25	1 ±0	1 ±0	1 ±0	1 ±0
30	1 ±0	1 ±0	1 ±0	1 ±0



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Evaluation - Question 1

The diagram shows the different applied voltages to the blower and the voltages generated by the wind wheel at different distances from the blower. What do you recognize?

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Evaluation - Question 2

Explain your observations from the previous question.

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