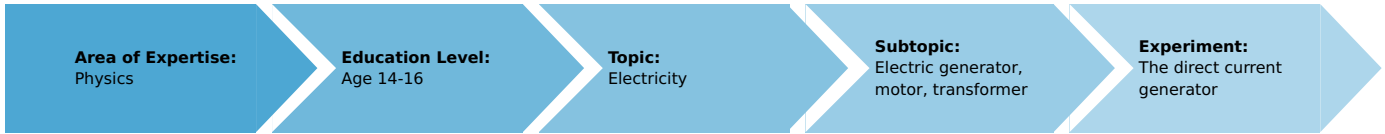


The direct current generator (Item No.: P1399200)

Curricular Relevance



Difficulty



Intermediate

Preparation Time



10 Minutes

Execution Time



10 Minutes

Recommended Group Size



2 Students

Additional Requirements:

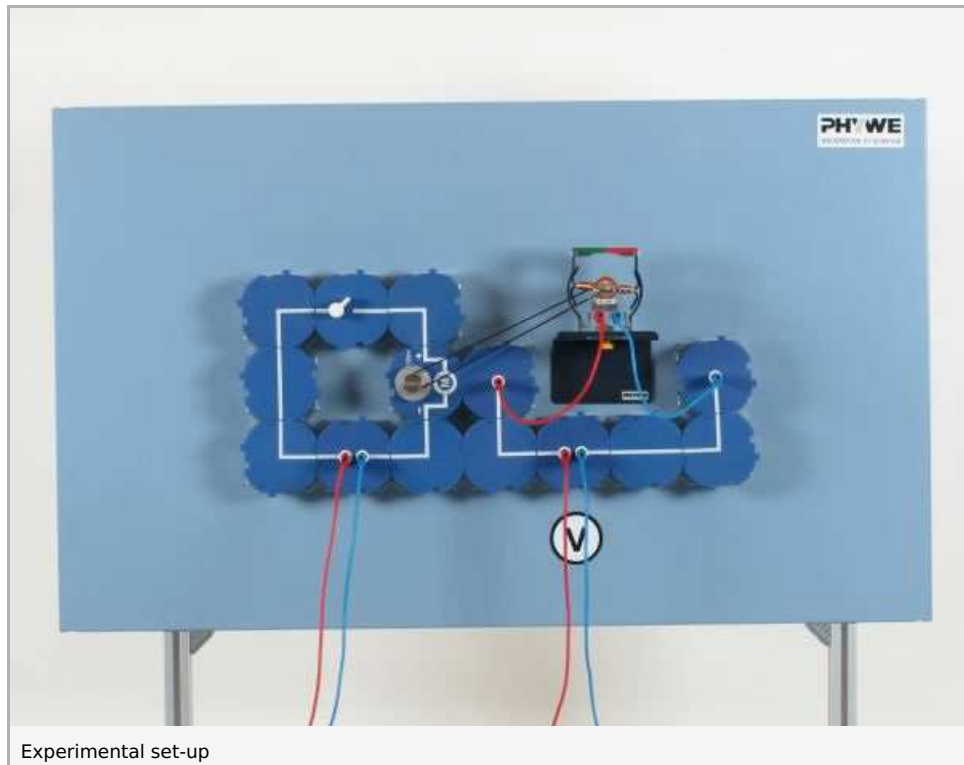
Experiment Variations:

Keywords:

Principle and equipment

Principle

The construction and mode of action of a direct current generator are to be demonstrated.



Experimental set-up

Equipment

Position No.	Material	Order No.	Quantity
1	Multimeter ADM2, demo., analogue	13820-01	1
2	PHYWE power supply, universal DC: 0...18 V, 0...5 A / AC: 2/4/6/8/10/12/15 V, 5 A	13500-93	1
3	Demo Physics board with stand	02150-00	1
4	Motor model f. magnet board	07850-20	1
5	Motor 12 V, module DB	09475-01	1
6	Switch on/off, module DB	09402-01	1
7	Socket for incandescent lamp E10 ,module DB	09404-00	1
8	Connector interrupted, module DB	09401-04	2
9	Junction, module DB	09401-10	2
10	Electr.symbols f.demo-board,12pcs	02154-03	1
11	Connector, straight, module DB	09401-01	2
12	Connector, angled, module DB	09401-02	6
13	Holder f.electr.motor,magn.board	07849-00	1
14	Magnet, bar-shaped, d = 18 mm, l = 70mm	06318-00	1
15	Filament lamps 4V/0.04A, E10, 10	06154-03	1
16	Connecting cord, 32 A, 1000 mm, red	07363-01	2
17	Connecting cord, 32 A, 1000 mm, blue	07363-04	2
18	Connecting cord, 32 A, 500 mm, red	07361-01	1
19	Connecting cord, 32 A, 500 mm, blue	07361-04	1

Set-up and procedure

- Set up the experiment as shown in Fig. 1, but first without the driving belt; select the 1 00 m V- measurement range and set the polarity of the ADM 2 so that it deflects to the right when the armature revolves clockwise
- Slowly, and as uniformly as possible, turn the rotor clockwise by hand; observe the ADM 2 (1)
- Reverse the positions of the magnetic poles and turn the rotor as before, and in the same direction; observe the ADM 2 (2)
- Change to the 10 m V- measurement range and set the power supply to 10 V; fit on the driving belt
- Switch on the power supply, close the switch and observe the ADM 2 (3)
- With the switch open, replace the building block with the measuring instrument by the building block with lamp socket plus filament lamp
- Close the switch; vary the voltage applied to the motor, and so also the speed of revolution of the generator, from 0 V upwards while observing the lamp

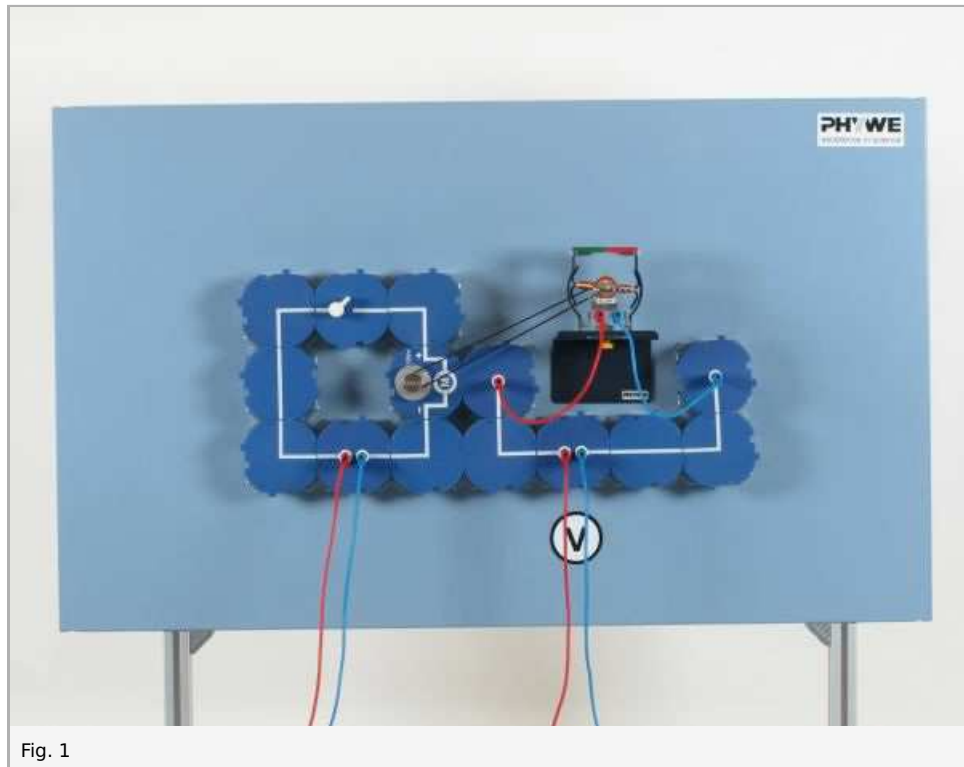


Fig. 1

Observation and evaluation

Observation

1. On slow turning of the rotor in the magnetic field of the stator, the pointer of the ADM 2 deflects twice in the same direction during a complete revolution of the rotor; a pulsing direct voltage is generated.
2. With the reverse direction of the magnetic field lines, the measuring instrument pointer is deflected in the opposite direction, i.e. the direction of the current is reversed
3. A higher voltage is induced at higher speeds of revolution of the rotor.
4. The performance of the generator increases with increasing speed of revolution of the rotor. The lamp finally starts to light up and its brightness increases with increasing speed of revolution.

Evaluation

A generator converts mechanical energy into electrical energy. In this experiment we are dealing with a direct current generator that works as an outer pole machine: An induction coil rotates in the magnetic field of a stationary permanent magnet, in the inside of which there is an iron core to increase the induction voltage generated by the rotation.

Both ends of the induction coil of the rotor are connected to half of a split slip ring. This is called a commutator, and enables the alternating voltage generated in the induction coil to be converted to a pulsing direct voltage.