

Motors and generators

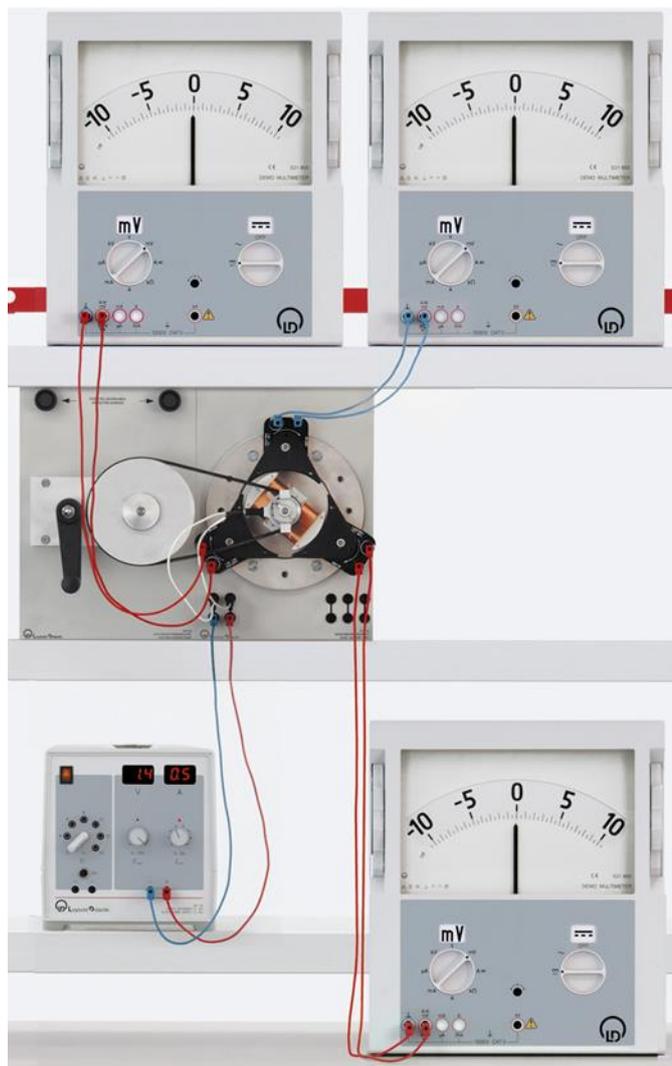
Generators

Generating a three-phase alternating voltage
Demonstration of voltage using demo-multimeters

Objects of the experiment

1. Demonstration of the design and investigation of the function of a generator for generating three-phase alternating voltage

Setup



Apparatus

1 Basic machine unit	727 81
1 ELM hand-cranked gear	563 303
1 ELM two-pole rotor	563 22
1 ELM brush holder rack	563 18
2 ELM brushes	563 13
3 ELM wide pole pieces for coils	563 101
3 ELM coils, 250 windings	563 11
1 ELM centring disc	563 17
1 Allen key	563 16
3 Demo multimeters, active	531 900
1 AC/DC power supply, 0...15 V/0...5 A	521 501
2 Connecting leads, 19 A, 100 cm, red	500 441
3 Pairs of connecting leads, 19 A, 50 cm	501 45
1 Demonstration panel frame	301 300
2 Equipment shelves	301 310
1 Profile rail	301 311
2 Bench clamps with pin	301 05

Procedure

- Select the zero point of the demo multimeters to be in the centre and set the function switch to "mV".
- Place the brushes in contact with the slip rings of the rotor and connect them to the DC output of the power supply.
- Use the power supply as a constant current source. To do this, turn the voltage limiting knob to its maximum.
- Set the current I via the adjustment knob to a value of about 0.5 A .
- Set the rotor turning by slowly rotating the pulley with the belt (do not use the hand-crank to start with) and observe the deflection of the demo-multimeters' needles.

Observation

All three measuring instruments exhibit a voltage which repeatedly changes polarity. These voltages are offset with respect to one another in terms of time.

Evaluation

If an electromagnetic rotor rotates between three induction coils each laid out 120° apart, it is possible to tap three separate alternating voltages, which are offset with respect to one another in terms of time, from the ends of the coils.

A generator from which three AC voltages can be tapped, each offset from the others in time, is called a three-phase generator and the voltage generated is called a three-phase (alternating) voltage.

Remark:

Three-phase generators are used in practice in power generating stations.