

Motors and generators

Motors

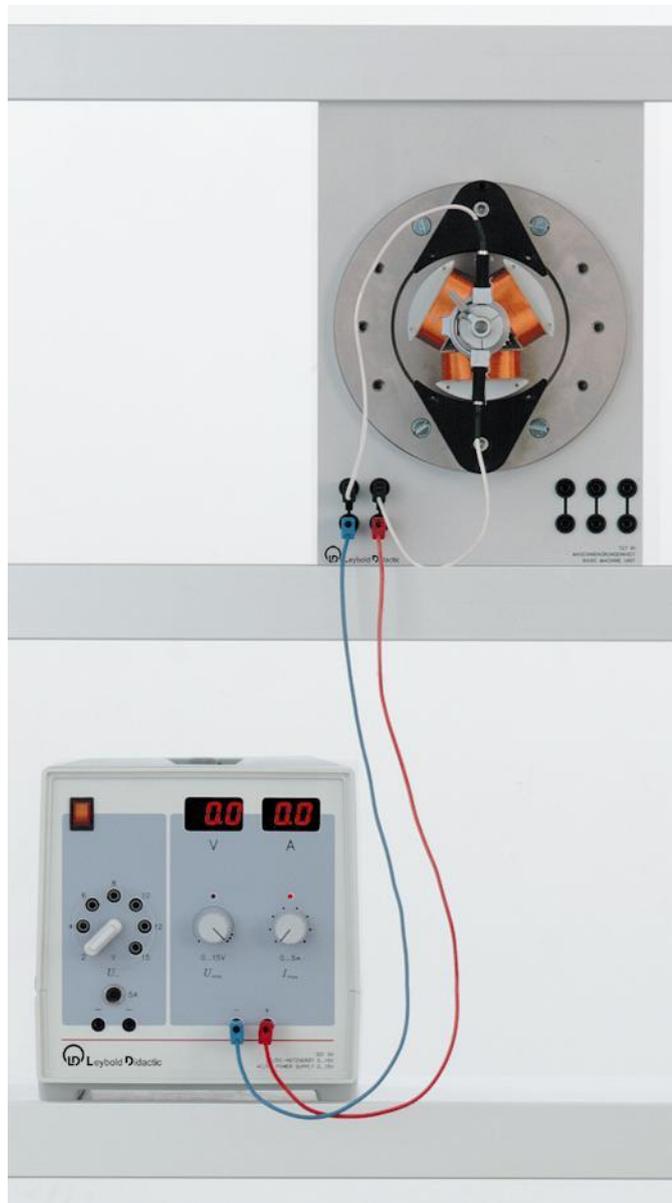
Self-starting DC motors

Motor with three-pole rotor

Object of the experiment

1. Investigate the function of a DC motor with a three-pole rotor

Setup



Apparatus

1 Basic machine unit.....	727 81
1 ELM three-pole rotor	563 23
1 ELM brush holder rack.....	563 18
2 ELM brushes.....	563 13
2 ELM pole pieces for magnets.....	563 091
1 Pair of magnets, 35 mm diam.	510 48
1 ELM centring disc	563 17
1 Allen key	563 16
1 Demo multimeters, passive.....	531 905
1 AC/DC power supply, 0...15 V/0...5 A.....	521 501
1 Pair of connecting leads, 19 A, 50 cm, red/blue..	501 45
1 Demonstration panel frame.....	301 300
1 Equipment shelf	301 310
1 Profile rail.....	301 311
2 Bench clamps with pin	301 05

Procedure

- Use the power supply as a constant current source. To do this, turn the voltage limiting knob to its maximum.
- Place the brushes in contact with the commutator of the rotor and connect them to the DC output of the power supply.
- Set the rotor rotating in any alignment to the magnetic field of the stator.
- Set the current I via the adjustment knob to a value of about 0.5 A and observe the rotor.
- Repeat the experiment with an arbitrary but different alignment of the rotor to the field.

Observation

Regardless of the alignment of the rotor to the magnetic field of the stator, when the rotor current is turned on, the rotor keeps rotating within the stator field.

Evaluation

A DC motor with a three-phase rotor is a self-starting motor.

Since each of the rotor coils is offset by 120° from the others, a DC motor with a three-pole rotor has no “dead point”

The motor can start up regardless of the alignment of the rotor to the magnetic field of the stator when a current flows to the rotor via the commutator.