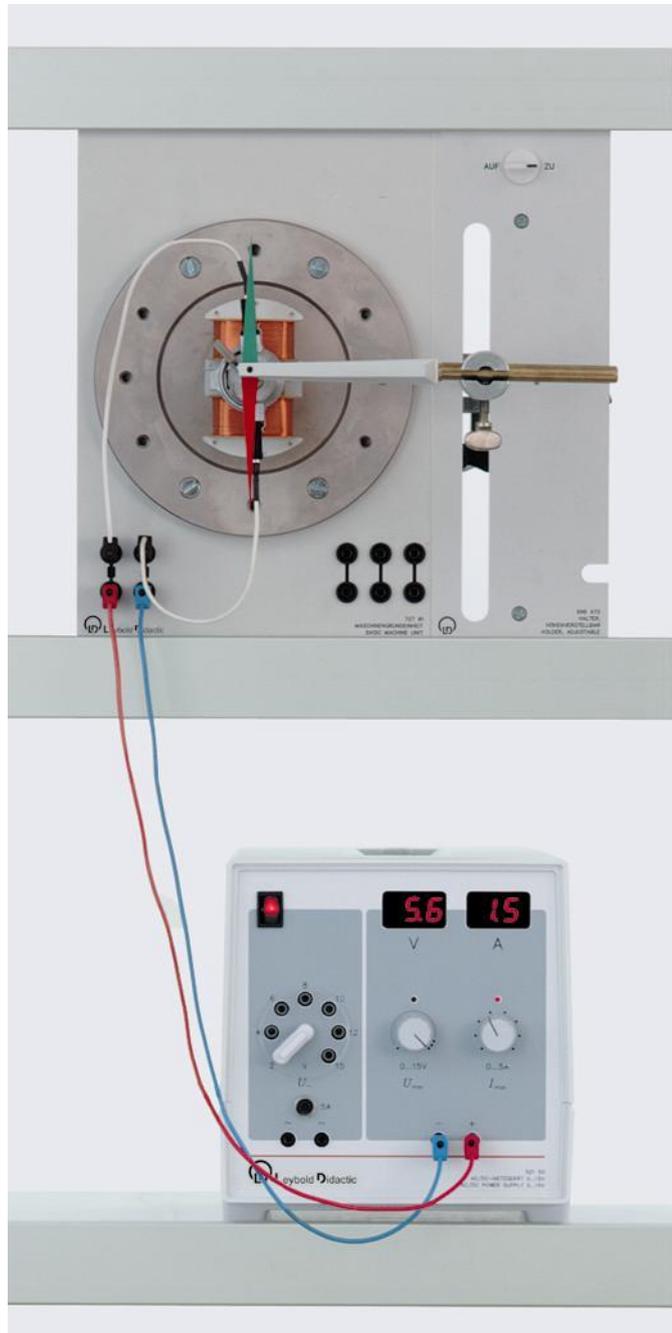


Motors and generators
Stators and rotorsMagnetic field of an electro-magnetic rotor with commutator
Demonstration with a magnetic field indicator needle

Object of the experiment

1. Investigate the magnetic field of an electromagnetic rotor with a commutator

Setup



Apparatus

| | |
|--------------------------------------------------------|---------|
| 1 Basic machine unit..... | 727 81 |
| 1 ELM two-pole rotor..... | 563 22 |
| 1 ELM brush holder rack..... | 563 18 |
| 2 ELM brushes..... | 563 13 |
| 1 Magnetic field indicator | 514 011 |
| 1 AC/DC power supply, 0...15 V/0...5 A..... | 521 50 |
| 1 Pair of connecting leads, 19 A, 50 cm, red/blue..... | 501 45 |
| 1 Holder with clamp, height-adjustable, CPS..... | 666 470 |
| 1 Universal bosshead | 666 615 |
| 1 Stand rod, 25 cm, 12 mm diam..... | 300 41 |
| 1 Demonstration panel frame..... | 301 300 |
| 1 Profile rail..... | 301 311 |
| 1 Equipment shelf | 301 310 |
| 2 Bench clamps with pin | 301 05 |

Procedure

- Attach the indicator needle in the middle of the rotor (two-pole rotor 563 22) and as close to it as possible.
- 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 slip rings of the rotor and connect them to the DC output of the power supply.
- Set up the rotor in a vertical position.
- Set the current I via the adjustment knob to a value of about 1.5 A and observe the indicator needle.
- Slowly turn the rotor by 180° until the brushes have passed beyond the break between the two parts of the commutator. Observe the indicator needle as you do this.
- Repeat the 180° rotation of the rotor as often as you want.

Observation

After a DC voltage has been applied, the indicator needle aligns itself parallel to the rotor.

When the rotor is turned, the indicator needle also turns by the same angle.

When the brushes pass the breaks in the commutator, the direction of the magnetic field between the arms of the rotor changes.

This change in the direction of the magnetic field occurs every time the rotor is turned by 180° .

Evaluation

If a current is fed into an electromagnetic rotor via a commutator, a magnetic field develops between the two arms of the rotor.

The magnetic field between the rotor arms always changes direction when the brushes have passed the break in the commutator, i.e. the direction of the magnetic field is dependent on the direction of current flow in the rotor coils.

The direction of the current flow through the rotor coils changes because the two rotating metal rings of the commutator (connected to the ends of the rotor coils) alternately pass the same fixed brush with the same polarity.