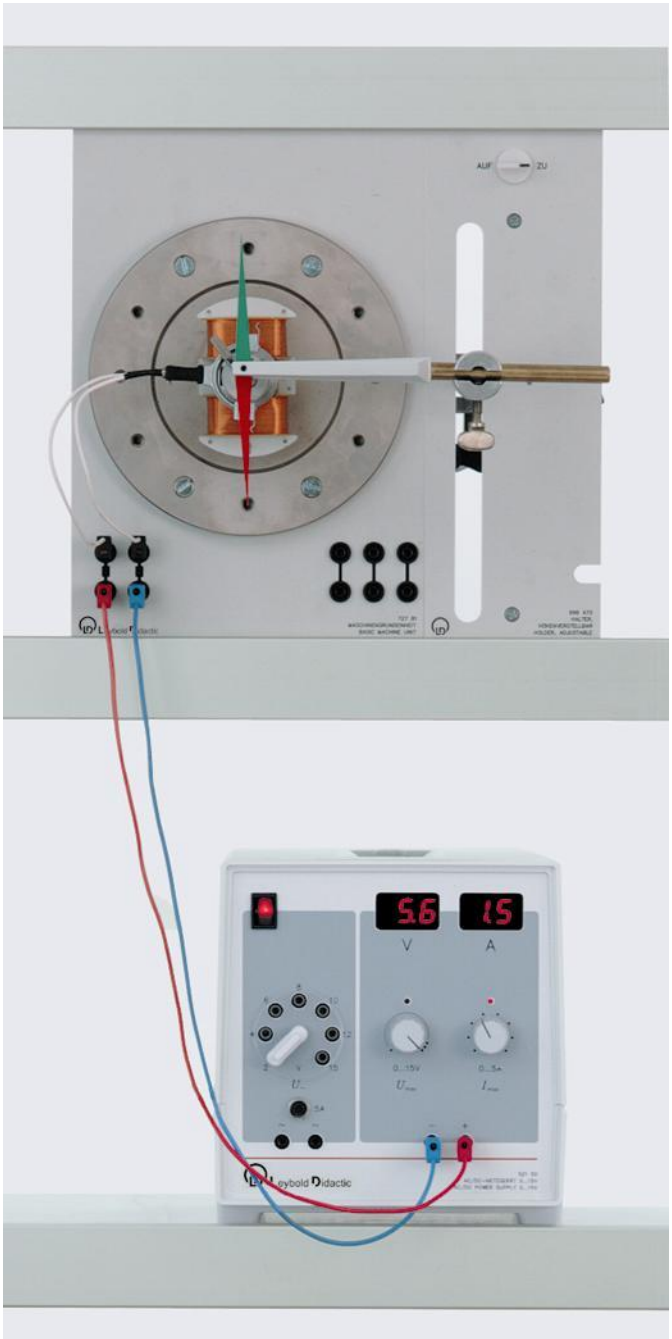
Magnetic field of an electro-magnetic rotor with slip rings

Demonstration with a magnetic field indicator needle

Object of the experiment

1. Investigate the magnetic field of an electromagnetic rotor with slip rings

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 the current *I* via the adjustment knob to a value of about 1.5 A and observe the indicator needle.
- Turn the rotor by 180° and observe the direction of the indicator needle again.
- Then use your hand to slowly turn the rotor through 360° and observe the direction of the rotor needle.
- Reverse the direction of the current through the rotor by swapping over the connecting leads at the DC output of the power supply and repeat the experiment.

Observation

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

When the rotor is turned, the needle turns with it.

If the direction of the current in the rotor is reversed, the indicator needle points in the opposite direction.

Evaluation

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

The direction of the magnetic field depends on the direction of the current flow in the rotor coils.

When an electromagnetic rotor is turned, the magnetic field surrounding it also turns by the same angle.

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