

Topics:

- The definition of magnetic field intensity
- The magnetic field intensity within current-carrying coils
- The magnetic field intensity at the centre of a current-carrying wire loop
- Magnetic moment

Special advantages:

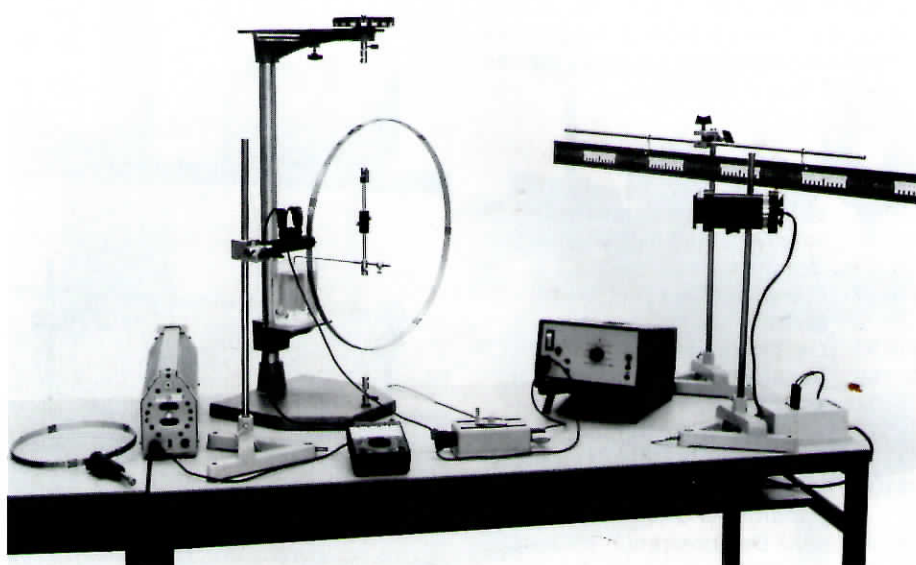
- Clearly arranged experiment assembly for practical work and demonstration.
- With sensitive torsion balance used as a magnetometer.

Equipment:

- 516 22 Set of solenoids
- 516 23 Accessories for Biot-Savart's law
- 516 01 Torsion balance
- 450 60 Lamp housing
- 450 51 Incandescent lamp. 6 V, 30 W
- 460 17 Single-lens condenser
- 300 02 Stand base, 20 cm
- 300 42 Stand rod, 0.47 m
- 301 01 LEYBOLD multiclamp
- 562 73 Transformer, 6 V/12 V, 30 W
- 531 53* Multimeter METRAVO 2 H-LH
- 504 49 Commutator switch
- 537 26 Rheostat 11 Ω
- 591 09 Variable extra low-voltage transformer S
- 501 31 (4 x) Connecting lead, 1 m
- 501 26 (4 x) Connecting lead, 0.5 m
- 516 04 Scale, 1 m long, on stand

For demonstration experiments instead of*:

- 531 88 E-measuring instrument D



In analogy to the electric field (experiment on page 4/5), the magnetic field is defined by the force it produces. But as magnetic monopoles do not exist, the intensity of the magnetic field is measured according to Gauss by the turning moment of a magnetic dipole. This turning moment arising in a small rod-shaped permanent magnet placed in the homogeneous field of a long solenoid is measured with a high-sensitivity torsion balance. Measuring the turning moment for different currents displays the proportionality between M and I . By doubling the number of turns n per unit of length l of the coil, one arrives at the

equation $M \propto I \cdot n/l$. M does not depend on the diameter of the coil if all other parameters remain constant as further investigations using additional coils show. By definition the value $I \cdot n/l$ represents the magnetic field intensity H in the MKSA system and the ratio $M/H = m$ is termed 'magnetic moment' of the rod-shaped permanent magnet used as a probe.

Additional measurements on Biot-Savart's law are possible using two Biot-Savart's law coils (dia. 40 cm or 20 cm respectively, each consisting of 10 turns with centre tap).

