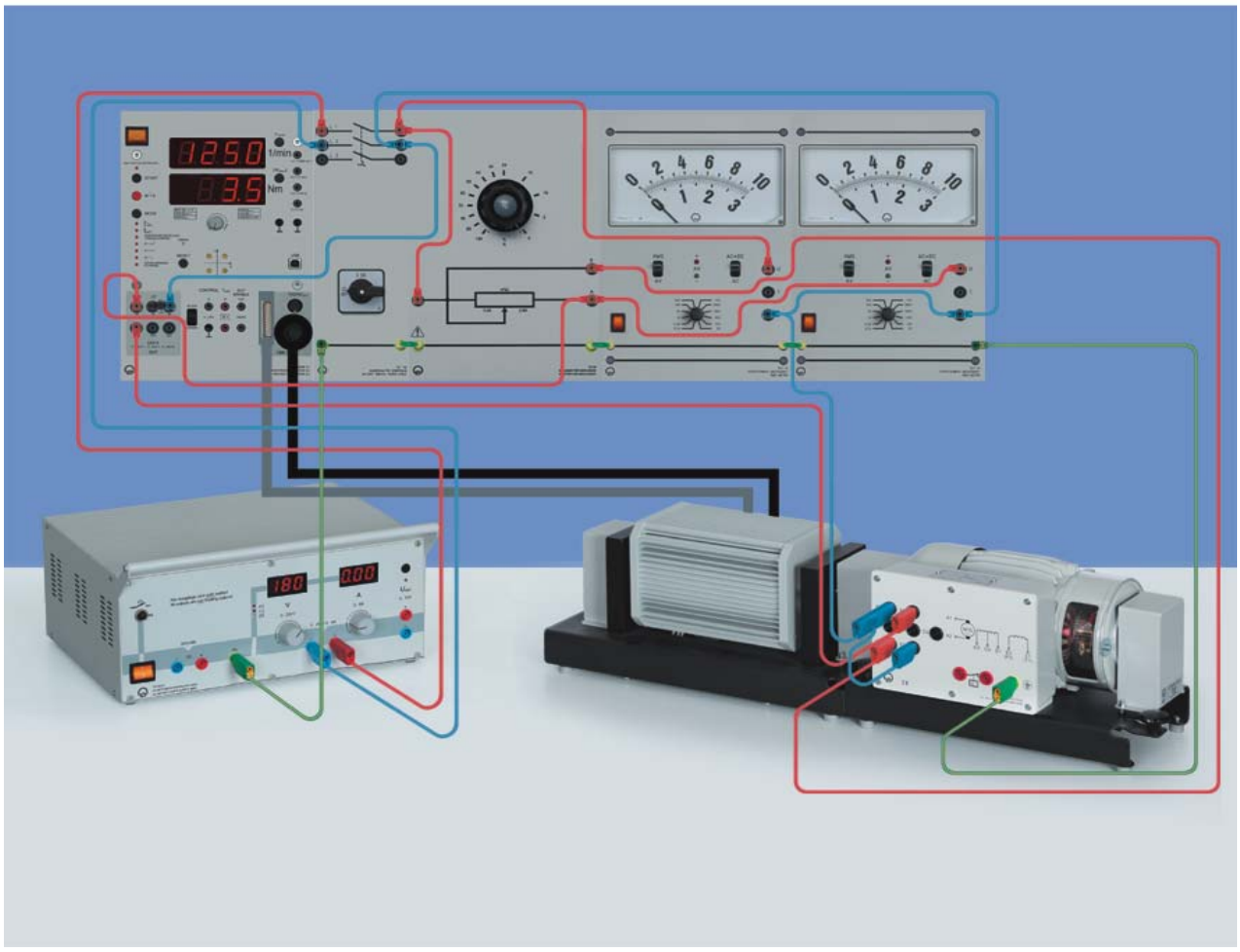
T 10.2 DC Motors

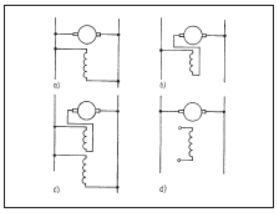


Topics

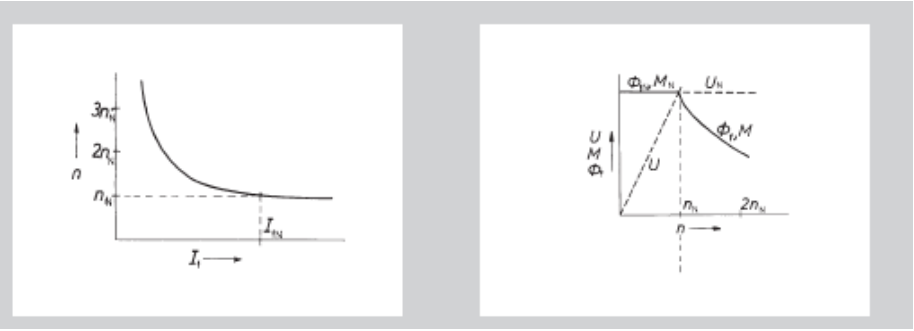
- Fundamentals
  - Design and function
  - how the commutator works
  - armature reaction and commutation
- Series-wound machine
  - Operation with constant voltage
  - possibilities of speed adjustment
  - starting and braking
  - energy conversion
- Shunt-wound machine
  - Operation with constant speed
  - self-excitation process
  - current-voltage characteristics
  - Operation with constant voltage,operating response, characteristics of motors, load characteristics, possibilities of speed adjustment and load setting
  - starting and braking
  - energy conversion

T 10.2 DC Motors

Although recently the DC machine has been getting more and more competition from asynchronous machines fed by frequency converters, it is still the machine of preference in some areas of drive technology. Whether it be for high-inertia starting, use in stonecrushers or cement works or in ironworks, the DC motors are indispensable. Their ability to handle high peaks in torque as well as the linearity of their speed characteristics over a broad range are areas where they excel. These machines can also still be found in the small motor range when there is only DC power available (e.g. automotive). LD DIDACTIC offers the entire spectrum of DC machines – shunt-wound, series-wound as well as compound-wound machines – in the power classes 0.3 kW and 1.0 kW. With its modular design there is a particular emphasis placed on conveying the fundamentals of rotating machines. Start up and operating circuits and auxiliary mechanisms as well as the determination of the mechanical and electrical characteristics complete the exercises. In TPS 12.3 “DC Drives” the DC machine is operated via a rectifier. Further investigations are made on its response to automatic current and speed control.



Exciter winding circuit for DC machines
a) Shunt-wound machine,
b) Series-wound machine,
c) Compound-wound machine,
d) separately-excited machine



Operating diagram of a speed-variable DC motor

Field-shunt characteristic of a DC shunt-wound machine