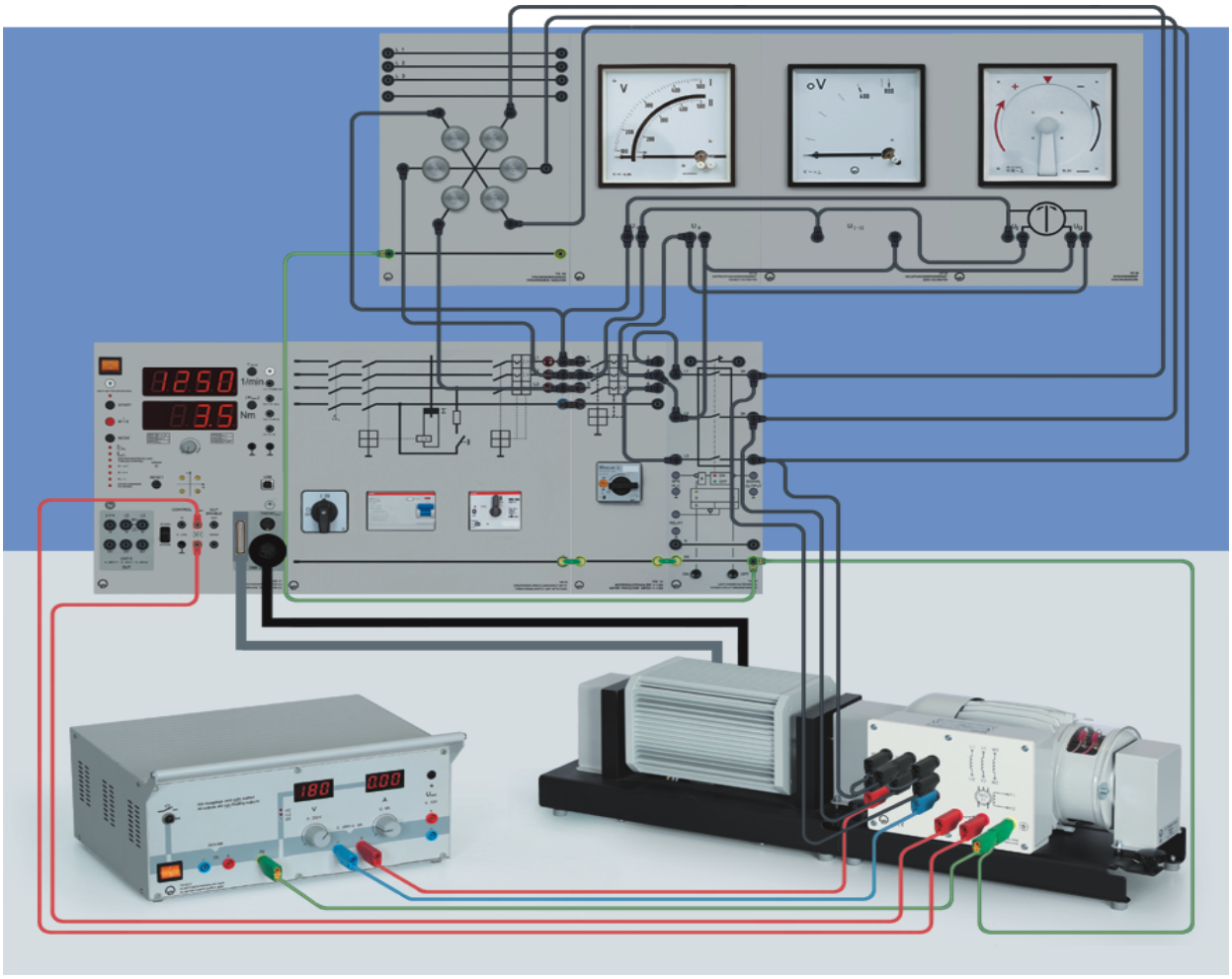
T 10.4.2 Synchronous Motors and -Generators



Topics

➔ Synchronous motor:

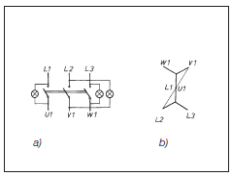
- Non-salient pole and salient pole rotor
- voltage equations,
- equivalent circuit diagram and vector diagram
- no-load and three-pole sustained short-circuit
- locus curves and control characteristics
- torque and load
- Potier reactance triangle and armature
- reaction
- synchronisation and parallel switching
- starting response for synchronous motors
- control of the reactance

➔ Synchronous generator:

- voltage generation
- excitation of the synchronous machine
- operating response
- armature current and torque,
- braking operation and locus curve
- starting and synchronisation
- single-phase generator

T 10.4.2 Synchronous Motors and -Generators

Three-phase machines also include synchronous machines. In contrast to asynchronous machines they run at constant speed and are dependent solely on the frequency of the revolving field. Thus they are independent of the load torque. Besides being operated as a motor – e.g. conveyor belts, textile machines, paper and other winding or reeling machines – it is also used as a socalled “phase-shifter”. Here the effect is exploited that both inductive as well as capacitive reactance can be tapped from the mains feed. For that reason it is used instead of large capacitors to compensate for inductive reactance – as it arises, for example, when machines are in operation.



Synchronisation mechanisms
a) synchronisingdark-method
b) vector diagram for synchronizing dark-method

However, the area where synchronous machines are really used is generator operation. They are used today anywhere from the small shaft generators of a ship’s power supply (several kW) up to the hydrogen-cooled power generators (several MW). Investigations are undertaken on run-up, excitation as well as efficiency and the various types of load. As drive machines you can use the AC pendulum machine for the 0.3 kW power class or the DC pendulum machine for the 1.0 kW class. Also of interest in this context is the topic of “power station control” which is dealt with in the subject area T 11 “Electrical Power Engineering”.

T10.4.2

Synchronous machines 0,3 kW

	Kat.-Nr.	
1	732 36	Synchronous machine SP 0,3
1	732 28	Multifunction machine 0,3
1	732 37	Synchronous machine VP 0,3
1	732 45	Reluctance Motor
1	569 2352L	Book: T 10.4.2 Synchronous machines 0,3 , Teacher edition (in English)
1	569 2352S	Book: T 10.4.2 Synchronous machines 0,3 , Student edition (in English)

For getting the complete equipment list please look at a actual offer.

T10.4.2

Synchronous machines 1,0 kW

	Kat.-Nr.	
1	733 06	Synchronous machine SP 1,0
1	732 98	Multifunction machine 1,0
1	733 07	Synchronous machine VP 1,0
1	569 2352L	Book: T 10.4.2 Synchronous machines 1,0 , Teacher edition (in English)
1	569 2352S	Book: T 10.4.2 Synchronous machines 1,0 , Student edition (in English))

For getting the complete equipment list please look at a actual offer.