

Three-Phase PWM Rectifier/Inverter

Course 86366

The Three-Phase PWM Rectifier/Inverter course builds on the knowledge the student gained in previous power electronics courses and in the Home Energy Production course to progress to the operation and characteristics of the three-phase PWM rectifier/inverter (grid-tied inverter). The PWM rectifier/inverter is a key device in several applications, such as the static synchronous compensator (STATCOM), large-scale production of electricity from solar power, the permanent-magnet synchronous generator (PMSG), etc.

The diagram on the left illustrates the control and power flow of a three-phase PWM rectifier/inverter. It shows a DC power source E_{DC} connected to a three-phase bridge. The bridge output passes through a three-phase filter and line inductors. The system includes current sensors and voltage sensors. The control system consists of a current control loop and a duty cycle control block. The current control loop receives active current and reactive current commands and provides feedback from current and voltage sensors. The duty cycle control block provides the reference for the three-phase bridge. The AC power source E_{AC} is connected to the system.

The photograph on the right shows a technician in a dark blue uniform working on a large, complex industrial power device, likely a STATCOM or PMSG, in a factory setting. The device consists of many stacked, cylindrical components. A caption below the photo reads "Photo courtesy of ABB".

Topic Coverage:

- » Study the three-phase PWM rectifier/inverter.
- » Analyze and understand the block diagram of the three-phase PWM rectifier/inverter.
- » Identify the most common applications of the three-phase PWM rectifier/inverter.
- » Study the effect of active current and reactive current command variation on a three-phase PWM rectifier/inverter.
- » Become familiar with both active power control and reactive power control using a three-phase PWM rectifier/inverter.

Features and Benefits:

- » The manual fully covers and explains the dq transformation and space vector modulation.
- » The course covers four-quadrant control of the three-phase PWM rectifier/inverter.

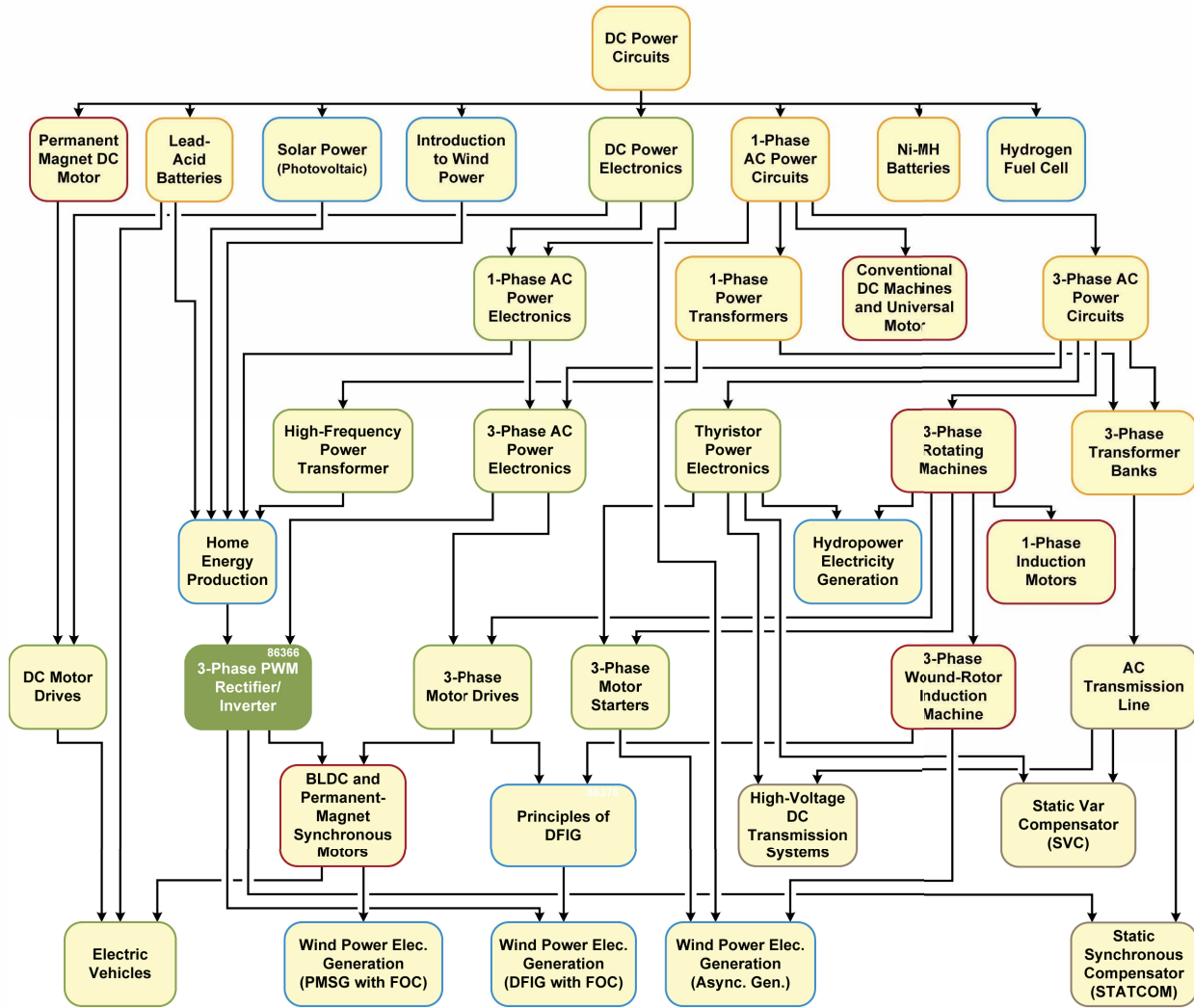


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Photo courtesy of Siemens



Lab-Volt Electric Power Technology Training Program



Equipment

Qty	Model	Description	Qty	Model	Description
1	8134-2	Workstation	1	8960-C	Four-Quadrant Dynamometer/Power Supply
1	8311	Resistive Load	1	9063	Data Acquisition and Control Interface (Extension Module)
1	8326	Three-Phase Filter	1	9063-B	Data Acquisition and Control Interface
1	8326-A	Line Inductors	1	9069-5	Three-Phase PWM Rectifier/Inverter Control Function Set
1	8354	Three-Phase Transformer	1	30004-2	24 V AC Power Supply
1	8823	Three-Phase Power Supply	1	86366/-1	Student Manual/Instructor Guide
1	8837-B	IGBT Chopper/Inverter			
1	8951-L	Connection Leads			
1	8951-N	Connection Leads			

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