SG104

Doubly-Fed Induction Generator in Wind Turbine System

Overview

The Doubly-Fed Induction Generator in Wind Turbine System is an advanced educational and research-oriented setup that enables detailed study and analysis of modern wind energy systems integrated into smart grids. One of its key features is the use of Double-Fed Induction Generators (DFIGs), which are widely employed in commercial wind turbines due to their efficiency, controllability, and cost-effectiveness.



Specifications

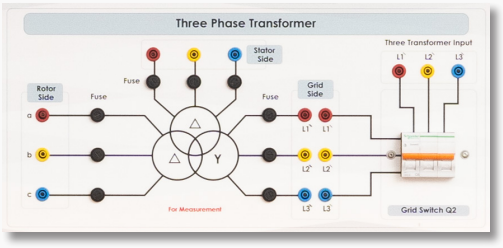
- The influence of wind force and the mechanical structure of wind power stations can be simulated using a servo machine test bench in combination with a turbine emulator software.
- The control system for the double-fed asynchronous generator (used in the wind power setup) enables intuitive operation and real-time visualization throughout the experiments.

Double-fed asynchronous generator
Code:(SG104.01)

- Three-phase asynchronous machine with slip-rings which can also be in the four quadrants
  - » Input voltage 110/220-volt Δ/Y.
  - » Input frequency 50 Hz.
  - » Nominal speed 3000 rpm
  - » Power: 200 watt

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3-Phase transformer
Code: (SG104.02)



- Three-phase transformer aims to limit the faults currents in grid tie experiments
  - » Primary voltage: 3 x 380 V
  - » Secondary voltage: 3 x 220 V
  - » Rated power: 1500 VA
  - » Inputs/outputs: 4-mm safety sockets
  - » Fuse protected

Dynamic grid fault simulator
Code: (SG104.03)



- Today's modern wind turbines are expected to remain operational during disturbances in the electrical grid rather than shutting down. This capability is known as «fault ride-through.
- The Module is used to replicate such grid faults, allowing for detailed analysis of how connected downstream equipment reacts under these fault conditions.
  - » Adjustable power failure durations from 5 s to 10 s 5-level, adjustable voltage drop for all phases.
  - » Symmetrical and asymmetrical grid faults can be set up
  - » Faults can be selected with or without earth contact
  - » Adjustable start angle fault ride-through analysis Graphic display Connector voltage: 3 x 400V, 50...60Hz

Double-fed asynchronous generator control unit
Code:(SG104.04)

- Contemporary wind power plants utilize double-fed asynchronous generators to supply electrical energy to the grid. In a laboratory setting, the control unit for the double-fed generator.
  - » Control unit for the rotor converter.
  - » Integrated brake chopper permits "fault ride-through" experiments.
  - » Manual control of reactive and active power, frequency,Voltage
  - » Automatic control of reactive and active power, frequency,Voltage

Data Acquisition and Control Interface
Code:(SG104.04)



- » Insulated Voltage Inputs (4)
- » Insulated Current Inputs (4)
- » Analog Inputs (8)
- » Analog Outputs (2)
- » Digital Outputs (8)
- » Computer I/O Interface USB 2.0

Experiments

- Manual Synchronization
- Automatic Synchronization
- Operation of the current control loop
- Controlling active power flow and reactive power flow
- Reactive power response in symmetrical and asymmetrical fault
- Double feed induction machine response in fault ride through

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Scope of Delivery

- Doubly-Fed Induction Generator in Wind Turbine System (SG104)
- Hard copy user manual

Options

- Digital content (BI01)

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