National Renewable Energy Laboratory
A national laboratory of the U.S. Department of Energy
Office of Energy Efficiency & Renewable Energy
Innovation for Our Energy Future

225-kW DYNAMOMETER FOR TESTING SMALL WIND TURBINE COMPONENTS

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The Opportunity

The National Wind Technology Center at NREL has commissioned a 225-kW dynamometer to facilitate the development of advanced generators, gearboxes, and power electronics to reduce the cost and improve the reliability of small wind turbines.

Test Capabilities

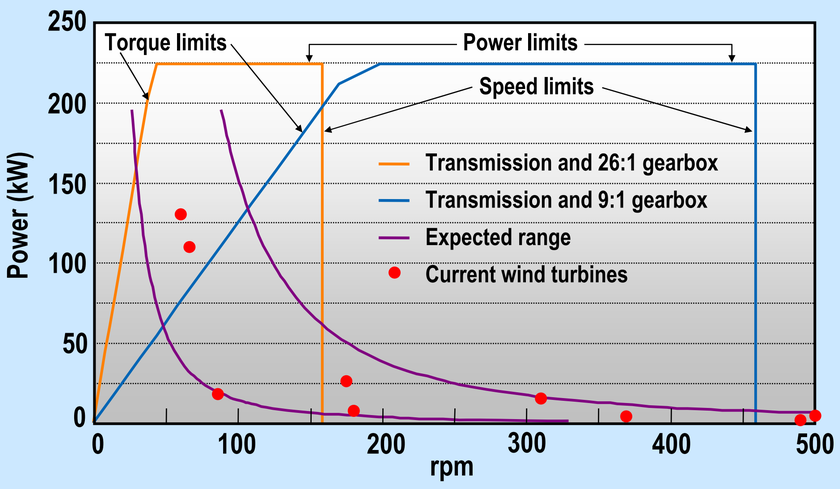
- Generator/Alternator Testing
  - Efficiency, cogging torque, equivalent circuit parameters, thermal characteristics, vibration, insulation life, etc.
- Gearbox Testing
  - Efficiency, thermal characteristics, lubrication flow, tooth contact patterns, vibration, endurance/fatigue, etc.
- Power Electronics Testing
  - Efficiency, thermal characteristics, control/stability, power quality, etc.
- Control Systems/Software Testing
  - System integration (generator/power electronics/grid)
  - Control parameter testing/tuning

Available Electric Services

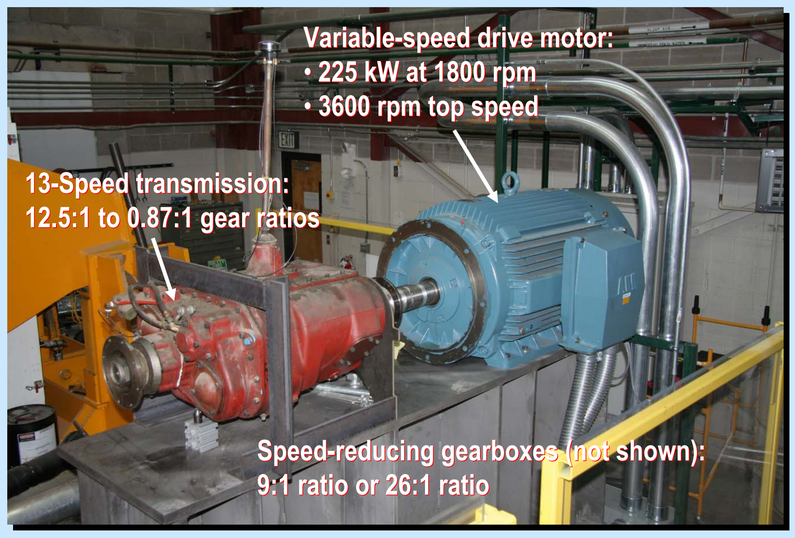
- 480 VAC, 3-phase, 60 Hz, 250 kVA
- 120/240 VAC, 1-phase, 60 Hz, 50 kVA
- Battery bank simulation, 20 kVA (voltage-controlled DC bus)
- Other voltages and frequencies possible

Operating Envelope

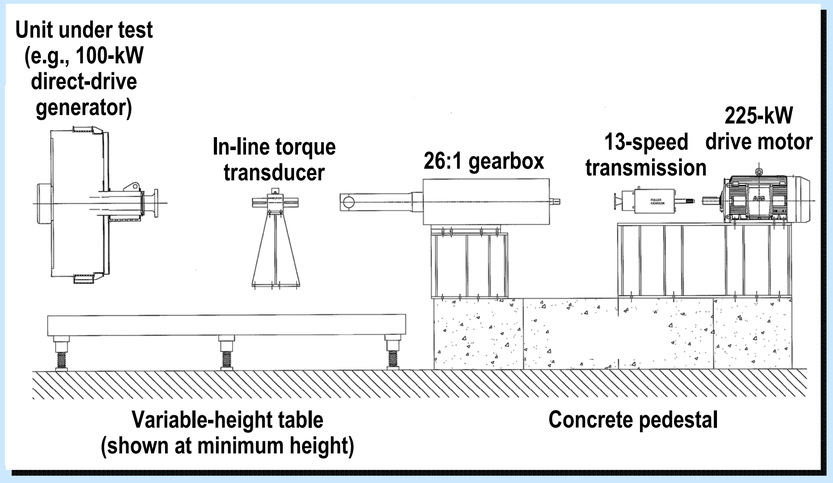
Maximum speed – 4140 rpm • Maximum torque – 37,000 ft-lb (51,000 Nm)



Dynamometer Components



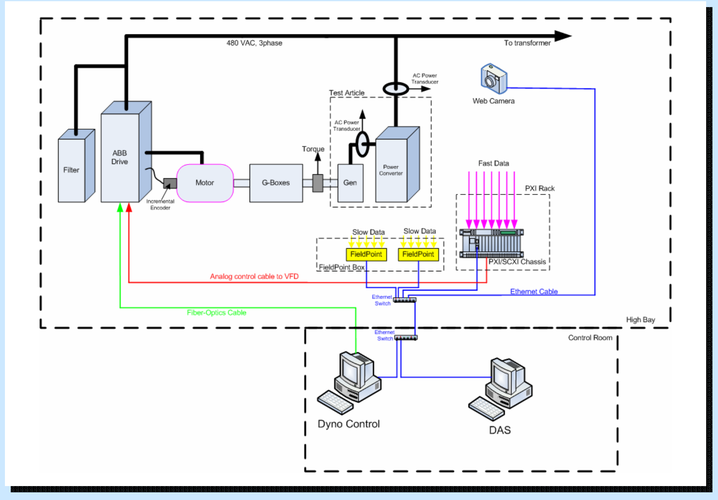
Example Configuration



Dynamometer Control Options

- Speed and/or torque
- Closed-loop or open-loop
- Manual or automated
- Ramps and steady state
- Simulated wind inputs including start-up, normal operation, turbulence, gusts, extreme winds, etc.
- Monitor component temperatures and alarm conditions

Data Acquisition and Control Schematic



Data Acquisition Parameters

- Shaft speed
- Shaft torque
- Power, voltage, and current from generator to converter
- Power, voltage, and current from converter to load
- Power quality
- Other parameters as needed

Partnering with NREL

- Collaboration with NREL through cooperative research and development agreements (CRADA)
- Testing services through work for others agreements (WFO)
- For more information: *http://www.nrel.gov/technologytransfer/partnering.html#crada*
- Contact: Jim Green, NREL • jim_green@nrel.gov • 303-384-6913

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