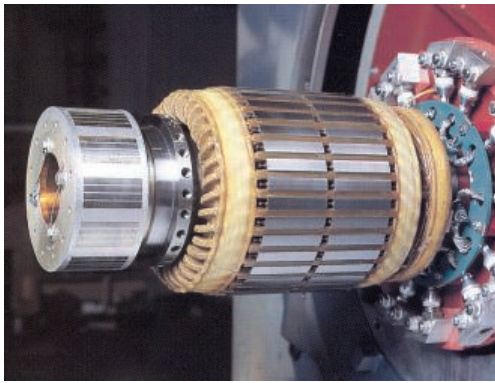




# Brushless Excitation System

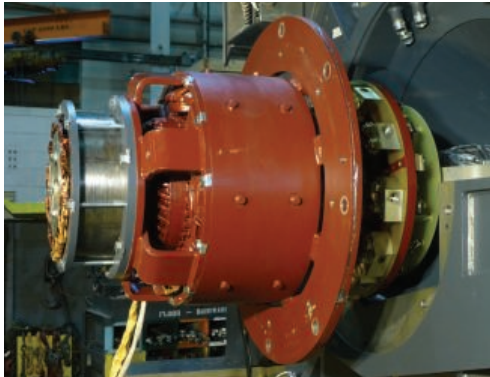
Series Diode Redundancy for 2-pole Generators  
265-700kW at 3,000-3,600rpm

Electric Machinery's (EM) brushless excitation system provides high reliability through elimination of brushes, collector rings and carbon dust, which in turn greatly reduces inspection and maintenance costs. Rotating rectifier redundancy with detection of diode failure while in operation allows for more convenient maintenance intervals.



Top row (L to R): Rotating rectifiers with armature; Stationary exciter field

Bottom row (L to R): Rotating rectifier wheel; Rotating armature and rectifiers



- 100% series redundant diodes provided to ensure continuous service.
- No exciter outboard bearing is required which eliminates alignment problems associated with three bearing arrangements.
- No carbon dust problems. The exciter operates in the same enclosure as the generator.
- The shaft driven permanent magnet pilot exciter provides a reliable source of exciter field power that eliminates bulky power transformer and dependence on station battery for field flashing.

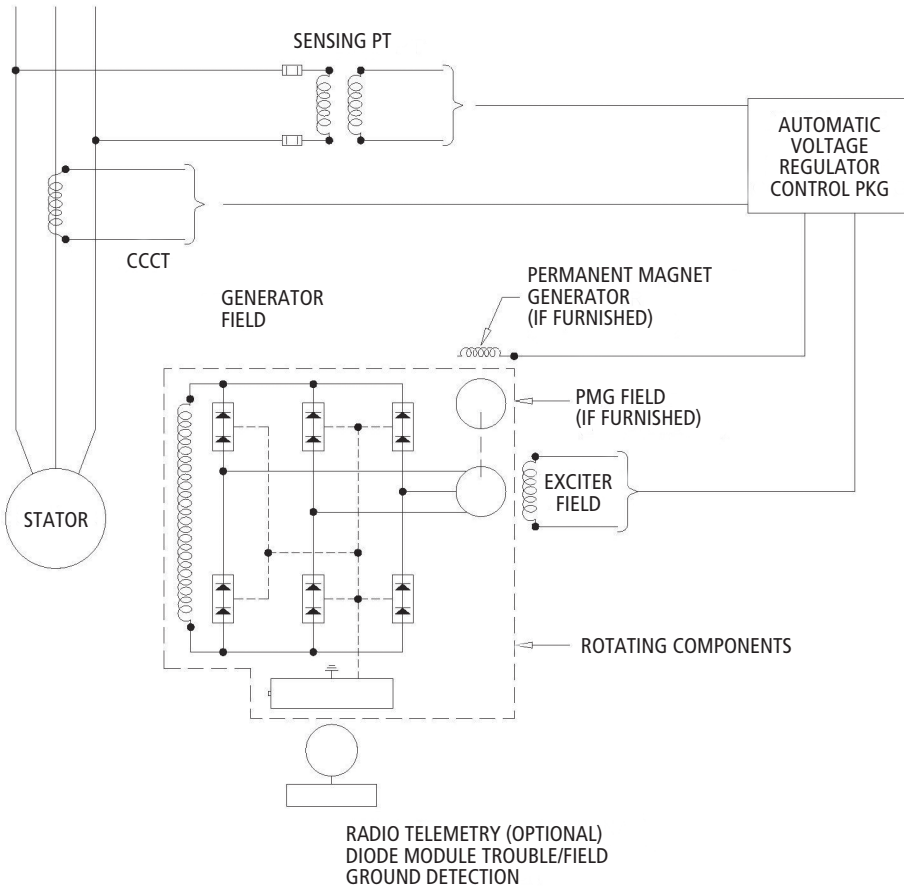
## Experience

- EM has over a century of design and manufacturing experience, and more than 500 units installed.
- EM is the industry leader in brushless excitation for 2-pole turbine generators.
- EM brushless exciters are utilized by generator manufacturers worldwide to meet their brushless requirements.

## How the brushless exciter provides generator main field excitation.

- Various designs are available to match voltage and current requirements.
- Ability to fit various shaft and mounting configurations.
- No collector rings, brushes or commutators which require maintenance, adjustments and inspections.
- Short circuit sustaining capability provides fault current support.
- No heavy bus work or cable connections are required between excitation cubicles and the generator, thus simplifying installations.
- Large expensive field circuit breaker and field discharge resistor are not required.
- Compact voltage regulator hardware for installation and control panel or switchgear eliminates large excitation cubicles.





Functional diagram of exciter with Permanent Magnet Generator.

**Brushless excitation provides increased reliability and reduced maintenance costs.**

The Permanent Magnet Generator (PMG) supplies high frequency AC power to the voltage regulator. The voltage regulator receives voltage and reactive current feedback provided by potential and current transformers to provide voltage and reactive current feedback. Comparing these signals to a reference setpoint in the voltage regulator, the voltage regulator provides a controlled variable DC current to the stationary field of the rotating exciter. With its stationary field and rotating armature, the exciter generates three phase high frequency AC output. This output is rectified by the rotating rectifiers. This DC current is fed via conductors to the center of the rotor shaft and carried by a special lead bar in the hollow shaft area

under the bearing journal which is then applied to the main generator field winding.

The rotating rectifier is a three phase full wave diode bridge. 100% diode redundancy provides 100% of full rating with a diode out of service.

For series redundancy 100% rated diodes are connected in series. Since diode failure results in shorting of a diode, the remaining diode will continue to provide full rating. Failure of a diode in module(s) is detected during operation by a radio telemetry system (optional).

Field ground detection is provided without slip rings by means of a transmitter mounted on the diode wheel assembly. A light signal is sent across an airgap to a stationary receiver and relay to indicate presence of a ground.



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