

Global Instrumentation and Control Ovation Excitation System (OES) for Generator Voltage Regulation

Background

The existing voltage regulators in nuclear units are all facing dwindling OEM support, part obsolescence concerns and a lack of knowledgeable plant technicians to maintain these systems. Westinghouse, via our alliance partner Emerson, has applied the Ovation™ Excitation System (OES) as a form, fit, function replacement for these systems that can reuse the existing cabinet footprint and provide enhanced functionality.

Description

OES is a fully redundant system that offers precise excitation control for a broad range of synchronous generators. The OES is designed to provide a highly reliable retrofit solution for a number of OEM excitation systems and can replace most rotating, brushless or static excitation systems ranging from 5A to 8000A.

The OES monitors the conditions of the generator and controls generator output using the firing circuits and power amplifiers. The OES also detects abnormal conditions and will take actions to protect the generator including limiters, forcing manual operation and tripping the generator lockout.



Excitation Controller Module



System Features

- Full redundancy
- Modular components for flexible design
- Fully tunable control algorithms
- Over & Under excitation limiting and protection
- Over-voltage/under frequency limiting and two levels of protection
- Automatic Voltage Regulator (AVR) control mode
- Field Control Regulator (FCR) control mode
- Base adjuster follower
- Power Factor (Pf) or Voltage-Ampere Reactive (VAR) control mode
- Numerous diagnostic alarms
- Can be installed in new or existing enclosures
- Requires minimal field wiring modifications

Maintenance Tools

- Online Diagnostics
- High-speed Oscillography
- Sequence of Events Monitoring
- OES Configuration Wizard
- OES Display
- Check I/O Utility
- Alarm Log View Utility
- Power System Stabilization (PSS)
- Configuration Wizard

Operator Graphics

Ovation's operator workstation software provides a dynamic view of all plant processes with the stability, performance and flexibility needed to operate today's power plants. Our integrated solution includes a series of Ovation graphics that provides users with voltage regulator data and allows the operator to provide commands to control the regulator. All graphics are viewable from any Ovation workstation. Standard graphics include an OES operator panel, manual controller window, alarm annunciator and an AVR cabinet overview.



Control Capabilities

Ovation's OES integration solution provides direct control of the voltage regulator from Ovation operator workstations using various control graphics. A graphic for controlling the field breaker control switch is used to start and stop excitation. The OES regulator mode graphic provides three valid operator selectable modes. The operator can select from the AC mode to regulate terminal voltage, DC mode to regulate generator field current or base mode to raise or lower field amps without closed loop control. A voltage adjuster graphic is used to adjust the set-point of the excitation system in both the AC and DC automatic control modes.

Ovation Excitation System Integration

Today's plants utilize a variety of equipment and associated control systems. This diversity can prove to be a challenge to cost and efficiency. Integration of control systems helps to preserve previous investments while easing operation and maintenance activities. Westinghouse's OES integration solution provides customers with a reliable, fault-tolerant communication interface between the voltage regulator and the Ovation Distributed Control System (DCS). The interface is used to provide plant operators with voltage regulator statuses such as generator voltage, field current and regulator alarms. The integration also provides a control interface to the voltage regulator with interactions performed through a graphic display on any Ovation DCS workstation in parallel with traditional hardware control switches and meters.

All power generators must contribute reactive power to the transmission system for sustained grid reliability. Several factors, such as the global increase in power demands and delays in producing new generating capacity to meet that demand have magnified the importance of improved power plant response capabilities. Effective performance of voltage regulators is critical for plant operators to quickly adjust voltage levels in order to maintain grid stability. The Ovation control system supports an ethernet based connection to the OES. Integrating the OES with the Ovation DCS provides a single monitoring source for plant generating processes, enhancing the operator's ability to track generator excitation system operations.

Installation / Service Support

The OES has been designed as a drop-in solution to reduce field installation time. It has the flexibility to be installed into existing cabinets (with minimal modifications) or new enclosures can be supplied for placement into the existing footprint. Westinghouse also offers System Support Services (S3) helping to maintain the Ovation system running at peak performance while managing lifecycle costs.

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