

A. Introduction

- 1. Title:** Automatic Voltage Regulators (AVR)
- 2. Number:** VAR-002-WECC-2
- 3. Purpose:** To ensure that Automatic Voltage Regulators on synchronous generators and condensers shall be kept in service and controlling voltage.
- 4. Applicability**
 - 4.1. Generator Operators
 - 4.2. Transmission Operators that operate synchronous condensers
 - 4.3. This VAR-002-WECC-2 Standard only applies to synchronous generators and synchronous condensers that are connected to the Bulk Electric System.
- 5. Effective Date*:** On the first day of the first quarter, after applicable regulatory approval.

B. Requirements

- R1.** Generator Operators and Transmission Operators shall have AVR in service and in automatic voltage control mode 98% of all operating hours for synchronous generators or synchronous condensers. Generator Operators and Transmission Operators may exclude hours for R1.1 through R1.10 to achieve the 98% requirement. *[Violation Risk Factor: Medium] [Time Horizon: Operations Assessment]*
 - R1.1.** The synchronous generator or synchronous condenser operates for less than five percent of all hours during any calendar quarter.
 - R1.2.** Performing maintenance and testing up to a maximum of seven calendar days per calendar quarter.
 - R1.3.** AVR exhibits instability due to abnormal system configuration.
 - R1.4.** Due to component failure, the AVR may be out of service up to 60 consecutive days for repair per incident.
 - R1.5.** Due to a component failure, the AVR may be out of service up to one year provided the Generator Operator or Transmission Operator submits documentation identifying the need for time to obtain replacement parts and if required to schedule an outage.
 - R1.6.** Due to a component failure, the AVR may be out of service up to 24 months provided the Generator Operator or Transmission Operator submits documentation identifying the need for time for excitation system replacement (replace the AVR, limiters, and controls

but not necessarily the power source and power bridge) and to schedule an outage.

- R1.7.** The synchronous generator or synchronous condenser has not achieved Commercial Operation.
- R1.8.** The Transmission Operator directs the Generator Operator to operate the synchronous generator, and the AVR is unavailable for service.
- R1.9.** The Reliability Coordinator directs Transmission Operator to operate the synchronous condenser, and the AVR is unavailable for service.
- R1.10.** If AVR exhibits instability due to operation of a Load Tap Changer (LTC) transformer in the area, the Transmission Operator may authorize the Generator Operator to operate the excitation system in modes other than automatic voltage control until the system configuration changes.

C. Measures

- M1.** Generator Operators and Transmission Operators shall provide quarterly reports to the compliance monitor and have evidence for each synchronous generator and synchronous condenser of the following:
 - M1.1** The actual number of hours the synchronous generator or synchronous condenser was on line.
 - M1.2** The actual number of hours the AVR was out of service.
 - M1.3** The AVR in service percentage.
 - M1.4** If excluding AVR out of service hours as allowed in R1.1 through R1.10, provide:
 - M1.4.1** The number of hours excluded,
 - M1.4.2** The adjusted AVR in-service percentage,
 - M1.4.3** The date of the outage.

D. Compliance

- 1. Compliance Monitoring Process**
 - 1.1 Compliance Monitoring Responsibility**
The British Columbia Utilities Commission
 - 1.2 Compliance Monitoring Period**
Compliance Enforcement Authority may use one or more of the following methods to assess compliance:
 - Reports submitted quarterly

- Spot check audits conducted anytime with 30 days notice
- Periodic audit as scheduled by the Compliance Enforcement Authority
- Investigations
- Other methods as provided for in the Compliance Monitoring Enforcement Program

The Reset Time Frame shall be a calendar quarter.

1.3 Data Retention

The Generator Operators and Transmission Operators shall keep evidence for Measures M1 for three years plus current year, or since the last audit, whichever is longer.

1.4 Additional Compliance Information

- 1.4.1** The sanctions shall be assessed on a calendar quarter basis.
- 1.4.2** If any of R1.2 through R1.9 continues from one quarter to another, the number of days accumulated will be the contiguous calendar days from the beginning of the incident to the end of the incident. For example, in R1.4 if the 60 day repair period goes beyond the end of a quarter, the repair period does not reset at the beginning of the next quarter.
- 1.4.3** When calculating the in-service percentages, do not include the time the AVR is out of service due to R1.1 through R1.10.
- 1.4.4** The standard shall be applied on a machine-by-machine basis (a Generator Operator or Transmission Operator can be subject to a separate sanction for each non-compliant synchronous generator and synchronous condenser).

E. Regional Differences

None

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Table of Compliance Elements

R	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	Operational Assessment	Medium	There shall be a Lower Level of non-compliance if AVR is in service less than 98% but at least 90% or more of all hours during which the synchronous generating unit or synchronous condenser is on line for each calendar quarter.	There shall be a Moderate Level of non-compliance if AVR is in service less than 90% but at least 80% or more of all hours during which the synchronous generating unit or synchronous condenser is on line for each calendar quarter.	There shall be a High Level of non-compliance if AVR is in service less than 80% but at least 70% or more of all hours during which the synchronous generating unit or synchronous condenser is on line for each calendar quarter.	There shall be a Severe Level of non-compliance if AVR is in service less than 70% of all hours during which the synchronous generating unit or synchronous condenser is on line for each calendar quarter.

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Version History

Version	Date	Action	Change Tracking
1	April 16, 2008	Permanent Replacement Standard for VAR-STD-002a-1	
1	April 21, 2011	FERC Order issued approving VAR-002-WECC-1 (FERC approval effective June 27, 2011; Effective Date July 1, 2011)	
2	November 13, 2014	Adopted by NERC Board of Trustees	
2	March 3, 2015	FERC letter order approving VAR-002-WECC-2	