

Reliability Objective

Automatic Voltage Regulators (AVR) are used to protect equipment and maintain reliable operation of the interconnection by ensuring that generators provide reactive support and voltage control, within generating Facility capabilities.

WECC Intent

The potential failure points and guidance questions give direction to registered entities as they assess risk while designing internal controls specific to NERC Reliability Standards and Requirements. The Registered Entity may use this document as a starting point in determining entity risk. It is not WECC's intent to establish a standard or baseline for entity risk assessment or controls design.

***Note:** Guidance questions help an entity understand and document its controls. Any responses, including lack of affirmative feedback, will have no consequences on an entity's demonstration of compliance at audit.*

**Please send feedback to InternalControls@WECC.org with suggestions on potential failure points and guidance questions.*

Potential Failure Points and Guidance Questions

Potential Failure Point: (R1) Failure to have a policy that requires the generator to be operated in a control mode.

1. If applicable, what procedures does your entity have for documenting and communicating the following conditions to relevant personnel:
 - a. Instructions from the Transmission Operator to operate in a control mode other than automatic voltage control mode?
 - b. An exemption from the Transmission Operator?

Potential Failure Point (R1): Failure to operate in the appropriate control mode.

1. What is the method for identifying an automatic voltage regulator (AVR) status change? Does your entity use a real-time situational awareness tool to generate alerts, or does it rely on policies and processes?
2. Does the procedure specify the steps and responsibility for changing AVR control mode?

3. What is a frequency and who is responsible to check AVR control status?

Potential Failure Point (R1): Failure to have a procedure for troubleshooting AVR control.

1. Who is responsible to troubleshoot the AVR control in case of misoperation?
2. Do the procedures specify the steps for troubleshooting, including a communication to the appropriate personnel?

Potential Failure Point: (R1): Failure to have procedures for notifying the Transmission Operator when the generator is not operating in a control mode.

1. Who is responsible for notifying the Transmission Operator?
2. Do the procedures specify how the notification should occur? For instance, what form of communication should be used? Which individual or role at the Transmission Operator should be notified?

Potential Failure Point: (R2) Failure to develop procedures that ensure the generator voltage or Reactive Power schedule provided by the Transmission Operator is maintained (within each generating Facility's capabilities).

1. Describe your entity's process to receive the generator voltage or Reactive Power schedule from the Transmission Operator.
2. Describe your entity's process to communicate the schedule internally so that all personnel who are responsible for maintaining the schedule are aware of their responsibilities, including short-term changes to the voltage schedule received from the Transmission Operator during real-time operations.
3. Describe your entity's process to ensure that generator voltage or Reactive Power schedule is continuously met and updated. Who is responsible for updating generator voltage or Reactive Power schedule?

Potential Failure Point: (R2.1) Failure to document strategies to meet the voltage or Reactive Power schedule provided by the Transmission Operator when an AVR is out of service.

Potential Failure Point: (R2.2) Failure to develop procedures for notifying the Transmission Operator of the reason that the voltage or Reactive Power schedule cannot be met.

Potential Failure Point: (R2.3) Failure to document and communicate a method for converting the scheduled voltage to the voltage being monitored.

Potential Failure Point: (R3) Failure to establish methods to monitor plant settings and conditions to determine whether the AVR, power system stabilizer, or alternative voltage controlling device is in service and controlling voltage.

1. Describe the method(s) your entity uses to monitor the status of voltage control devices.
 - a. If voltage control device status is monitored via an alarm:



- i. What process does your entity follow to establish alarm parameters (alarm priority, color coding of alarms, different audible alarms, depending on the severity)? Is single alarm acknowledgement required, or is batch acknowledgement allowed?
 - ii. Who receives the alarm?
 - iii. Does your entity have documented procedures for recording the acknowledgement of alarms via EMS or DCS logs?
 - iv. What training is provided to people who monitor alarms?
 - v. Does your entity have documented procedures to follow if an alarm indicates that the device is not in the voltage control mode or the AVR is not in service?
- b. If your entity uses a manual process to monitor the voltage control device status, how frequently does the verification occur?
2. Have you identified any specific circumstances, such as upon unit start-up or following software updates, that would prompt personnel to check whether the status of the voltage control device has changed?

Potential Failure Point: (R3) Failure to develop procedures for notifying the Transmission Operator of a change in the voltage control device status.

1. How does your entity track what time there was a status change on the AVR, power system stabilizer, or alternative voltage controlling device?
2. What procedures or controls are in place to remind personnel to notify the Transmission Operator?
3. What controls are in place to track whether notifications have occurred within 30 minutes of the change?

Potential Failure Point: (R4) Failure to establish methods to monitor for a change in reactive capability due to factors other than a change in voltage control device status.

1. Describe the method(s) your entity uses to monitor for changes in reactive capability.
2. Has your entity documented any specific strategies for personnel to use to determine the cause of the change in reactive capability?
3. Does your entity's process define what constitutes "becoming aware of a change"?

Potential Failure Point: (R4) Failure to develop procedures for notifying the Transmission Operator of a change in reactive power capability.

1. How does your entity track when personnel became aware of the change?
2. What procedures or controls are in place to remind personnel to notify the Transmission Operator?



3. What controls are in place to track whether notifications have occurred within 30 minutes of becoming aware of a change?

Potential Failure Point (R5): Failure to record and track required data described in the R5.

1. Who is responsible for recording and recordkeeping of required data?
2. What controls are in place to track whether data was provided within 30 calendar days to the Transmission Operator and Transmission Planner?

Potential Failure Point (R6): Failure to update step-up transformer tap changes as directed by the Transmission Operator.

1. Who is responsible to coordinate tap changes with the TOP?
2. What is the process and who is responsible for performing and documenting tap changes on the step-up transformer?

