



To: Generator Operators Connected to the APS Non-Bulk Electric System (Non-BES)
From: APS Transmission Operations Support
Subject: Voltage Schedules
Effective Date: October 20th, 2025

The following information shall be used to establish and change the voltage schedule at a Non-BES Generator Operator facility connected to the APS Non-BES with a POI of less than 100kV and nameplate capacity greater than or equal to 10MW.

Generators with a nameplate capacity less than 10MW shall follow APS interconnection requirements located on <http://www.APS.com/dg>. For generators connected to the APS BES refer to the voltage schedule letter “Generator Operators Connected to the APS Bulk Electric System (BES)” available on <http://www.oasis.oati.com/azps/>.

Synchronous Generators / Synchronous Condensers

Each synchronous generator or synchronous condenser connected to APS Non-BES shall operate in Automatic Voltage Regulator (AVR) mode and maintain generator terminal voltage at nominal rated voltage of the generator within +/-5%. This schedule is valid at all times unless otherwise instructed by APS Transmission Operations.

Inverter-Based Resources

For each of these modes, the point of control can either be at the site collector bus or the high side of the site transformer (POI), depending on the implementation of the power plant controller (PPC). If a generator is capable of dynamic VAR support when not producing active power, then these settings are also applicable for this generator when this capability is enabled.

Default Operating Mode – Volt/VAR Control

Each inverter-based resource connected to the APS non-BES should operate by default in Volt-VAR mode as defined in Attachment 1 of this letter. The Vref for the Volt-VAR mode as defined in Attachment 1 should be adjustable in real time to allow transmission operations to request a change in the reactive power output of the plant. The setpoints for this mode must be adjusted based on the nominal voltage level of the transformer high side or POI as defined in the table below. The point of control must be at the POI unless APS agrees to a different point of control.

Alternate Modes of Operation

- Automatic Voltage Regulation - If the inverter-based resource connected to APS Non-BES is capable of operating in Automatic Voltage Regulator (AVR) mode and Transmission Operations has directed operation in this mode, maintain the controlled bus

voltage to a setpoint within the nominal rated voltage of +/-5%. This schedule is valid at all times unless otherwise instructed by APS Transmission Operations. The PPC is required to implement an adjustable droop function for sites that control the high side of the GSU/POI in AVR mode. Initial voltage setpoint and droop settings should be coordinated with APS Transmission Operations Engineering.

- Power Factor Regulation - If the inverter-based resource connected to APS Non-BES is capable of operating in Constant Power Factor mode and Transmission Operations has directed operation in this mode, maintain constant power factor at the point of control. By default maintain a nominal 0.98 PF leading unless a different setpoint is directed by the transmission operator. This schedule is valid at all times unless otherwise instructed by APS Transmission Operations.

Change of Setpoint

APS Transmission Operations will provide changes to the voltage schedule in real time as system needs change. The APS Transmission Operator will direct changes to the reactive power output of the unit. The customer will adjust the setpoint of the active control mode to reach the directed reactive power output. This new set point will be the new voltage schedule.

APS Transmission Operations Engineering will maintain the assigned operating mode and settings for generators with a nameplate capacity greater than 10MW connected to the APS Non-BES. Transmission Operations Engineering will also maintain documentation on the capability of generators to use additional operating modes.

APS Transmission Operations is responsible for maintaining subtransmission system voltage in its TOP area within the system voltage limits specified in the table below:

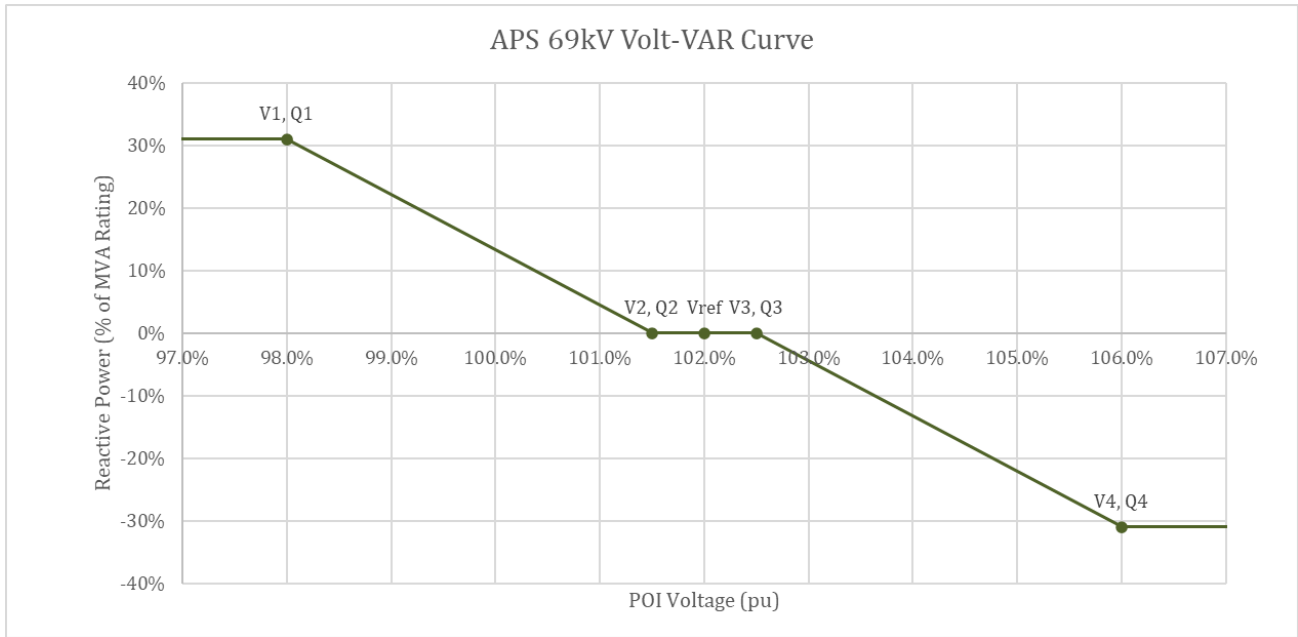
<i>Nominal Voltage Level</i>	<i>Alarm Limit</i>	<i>Continuous Limit</i>	<i>Emergency Limit</i>
69 kV	+6% / -3%	+/- 6%	+/- 10%
34.5 kV	+6% / -4%	+/- 6%	+/- 10%

Any requests regarding voltage schedules on the APS Non-BES may be submitted via email to opssupport@aps.com

Respectfully,
Roque Galaz Machado
 Supervisor, Transmission Operations Engineering
 Arizona Public Service

Attachment 1

Voltage-Reactive Power (Volt-VAR) Mode Settings:



Point	Value	Description
V1	0.98	Undervoltage where VARs operate at limit.
V2	1.015	Undervoltage where VARs are at minimum.
Vref	1.02	Default reference voltage.
V3	1.025	Overvoltage where VARs are at minimum.
V4	1.06	Overvoltage where VARs operate at limit.
Q1	0.31 inj	VARs at V1. LGIA requires 0.95 Power Factor. 31% min injection reactive power capability of nameplate MVA.
Q2	0	VARs at V2. Value based percentage of nameplate MVA.
Q3	0	VARs at V3. Value based percentage of nameplate MVA.
Q4	0.31 abs	VARs at V4. LGIA requires 0.95 Power Factor. 31% min absorbing reactive power capability of nameplate MVA.
Open Loop Response Time	8 sec	The duration from a step change in control signal input (reference value or system quantity) until the output changes by 90% of its final change, before any overshoot.

Abs – Absorption, Inj – Injection