

TEXAS RE

PRC-024-3 R1& R2 Considerations

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PRC-024-3 R1 & R2



PRC-024-3 — Frequency and Voltage Protection Settings for Generating Resources

B. Requirements and Measures

- R1. Each Generator Owner shall set its applicable frequency protection⁵ in accordance with PRC-024 Attachment 1 such that the applicable protection does not cause the generating resource to trip or cease injecting current within the "no trip zone" during a frequency excursion with the following exceptions: [Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]
 - Applicable frequency protection may be set to trip or cease injecting current within a portion of the "no trip zone" for documented and communicated regulatory or equipment limitations in accordance with Requirement R3.
- M1. Each Generator Owner shall have evidence that the applicable frequency protection has been set in accordance with Requirement R1, such as dated setting sheets, calibration sheets, calculations, or other documentation.
- R2. Each Generator Owner shall set its applicable voltage protection⁵ in accordance with PRC-024 Attachment 2, such that the applicable protection does not cause the generating resource to trip or cease injecting current within the "no trip zone" during a voltage excursion at the high side of the GSU or MPT, subject to the following exceptions: [Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]
 - If the Transmission Planner allows less stringent voltage protection settings than those required to meet PRC-024 Attachment 2, then the Generator Owner may set its protection within the voltage recovery characteristics of a location-specific Transmission Planner's study.
 - Applicable voltage protection may be set to trip or cease injecting current during a voltage excursion within a portion of the "no trip zone" for documented and communicated regulatory or equipment limitations in accordance with Requirement R3.
- M2. Each Generator Owner shall have evidence that applicable voltage protection has been set in accordance with Requirement R2, such as dated setting sheets, voltage-time boundaries, calibration sheets, coordination plots, dynamic simulation studies, calculations, or other documentation.



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PRC-024-3 R1 / Attachment 1

The area outside the boundary of the "No Trip Zone" is NOT a "MUST Trip Zone"

- Consider leaving a buffer
- The duration shown in tables and charts of Attachment 1 show that the duration is a "Minimum Time"
 - Ends at 10k seconds for frequency
 - The horizontal axis does not continue indefinitely





Figure 4

* The area outside the "No Trip Zone" is not a "Must Trip Zone."

Frequency Boundary Data Points - ERCOT Interconnection

High Frequency Duration		Low Frequency Duration	
Frequency (Hz)	Minimum Time (Sec)	Frequency (Hz)	Minimum Time (sec)
≥61.8	Instantaneous ⁹	≤57.5	Instantaneous ⁹
≥61.6	30	≤58.0	2
≥60.6	540	≤58.4	30
<60.6	Continuous operation	≤59.4	540
		>59.4	Continuous operation

Table 4



Public

PRC-024-3 R1 & R2 Considerations

PRC-024-3 R2 / Attachment 2

The area outside the boundary of the "No Trip Zone" is NOT a "MUST Trip Zone"

- Consider leaving a buffer
- The duration shown in tables and charts of PRC-024-3 R2 Attachment 2 show that the duration is a "Minimum Time"
 - Ends at four seconds for voltage
 - The horizontal axis does not continue indefinitely



PRC-024 — Attachment 2 (Voltage No-Trip Boundaries – Eastern, Western, and ERCOT Interconnections)





* The area outside the "No Trip Zone" is not a "Must Trip Zone."

Voltage Boundary Data Points

High Voltage Duration		Low Voltage Duration	
Voltage (pu)	Minimum Time (sec)	Voltage (pu)	Minimum Time (sec)
≥1.200	0.00	<0.45	0.15
≥1.175	0.20	<0.65	0.30
≥1.15	0.50	<0.75	2.00
≥1.10	1.00	<0.90	3.00
<1.10	4.00	≥ 0.90	4.00

Table 1



PRC-024-3 R1 & R2 / Equipment Limitation Exception(s)

 In some cases, there is potential for confusion in the language or graphics provided in the original equipment manufacturer's (OEM's) documentation, which may lead to entities misidentifying a limitation/exception

 Consider reaching out to the OEM to obtain clarification so that the appropriate action(s) can be taken

Consider developing a process for obtaining acknowledgement responses from the Transmission Planner (TP) when equipment limitations or exemption requests are communicated per R3, to ensure that they are aware of the resource limitations and thus able to evaluate any additional considerations necessary to maintain system reliability





Registered entities should ensure that any studies/tests conducted to develop and verify protection system settings for compliance with PRC-024-3 simulate and measure voltage excursions "at the high side of the GSU or MPT" as specified in R2

R2 includes an additional exception for cases where the TP allows for less stringent settings than those required by PRC-024 Attachment 2, the GO may set its protection within the parameters of a location-specific study by the TP





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Additional Resources



Engagement Common Questions Spreadsheet (Texas RE Website)

ERO Enterprise Endorsed Implementation Guidance Document for Generator Voltage Protective Relay Settings



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Questions?

