

Ameren Illinois DER Plant Control System Requirements

Purpose

This document provides a reference to the functional requirements for plant control systems that are used to manage the behavior of an inverter-based DER generation source. These requirements are derived primarily from information contained in the IEEE 1547-2018 Standard, which is referred to in the remainder of this document as "*the Standard*". Any exceptions to this are noted below.

Applicability

The purpose of a plant control system as described in this document is to command the real and reactive power flow at each inverter within the DER site to produce the desired system behavior at the Reference Point of Applicability (RPA). The RPA is defined in *the Standard* Section 4.2 and in most cases, it is the Ameren Illinois revenue meter.

Prioritization of operating requirements shall follow *the Standard* Section 4.7

Performance Categories

The plant control system shall conform to normal operating range **Category B** and abnormal operating range **Category III**. These performance categories are defined in *the Standard* Annex B.

Normal Operating Condition Requirements

Under normal operating conditions, the plant control system shall support the following minimum set of control capabilities.

1. The control capabilities described in *the Standard* Sections 4.6.1 – 4.6.3. This includes the limit of real (active) power.
2. The enter service ramp rate may be managed either at the individual inverter(s), or by the plant control system.
3. All control modes described in *the Standard* Sections 5.3 and 5.4 and automatic (constant) voltage regulation (AVR). This includes the following control modes:
 - a. Constant Power Factor (5.3.2)
 - b. Voltage-reactive power (5.3.3)
 - c. Active power-reactive power (5.3.4)
 - d. Constant reactive power (5.3.5)
 - e. Voltage-active power (5.4.2)
 - f. Constant voltage

Abnormal Operating Conditions

Under abnormal operating conditions, the DER plant shall support the following minimum set of capabilities.

1. Voltage ride-through and tripping controls as described in *the Standard* Section 6.4 (and subsections) **except for Table 13 – DER Response (DER shall trip) to abnormal voltages for DER of abnormal operating performance Category III**. For this table, the values from the IEEE 1547a-2020 Standard must be used.
2. Frequency ride-through, trip and droop controls as described in *the Standard* Section 6.5 (and subsections)

It is the responsibility of the DER owner to implement settings, either at the inverter or plant level, to ensure that the DER plant meets these ride-through and trip requirements at the RPA.

Note that while the DER plant is expected to respond appropriately to utility grid loss events as described in *the Standard* Sections 8.1 (Unintentional islanding) and 6.2.2 (Open phase conditions), this response capability may be implemented using methods other than the plant control system.