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IEEE Guide for Voltage Sag Indices

IEEE Power and Energy Society

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of the
IEEE Power and Energy Society

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Abstract: Appropriate voltage sag indices and characteristics of electrical power and supply systems as well as the methods for calculating them are identified. Methods are provided for quantifying the severity of individual voltage sag events, for quantifying the performance at a specific location (single-site indices), and for quantifying the performance of the whole system (system indices). Multiple methods are presented for each. The methods are appropriate for use in transmission, distribution, and utilization electric power systems.

Keywords: IEEE 1564™, power quality, power distribution faults, voltage sags

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Introduction

This introduction is not part of IEEE Std 1564™-2014, IEEE Guide for Voltage Sag Indices.

This guide provides methods for computing voltage sag indices and characteristics. Voltage sag indices are one way of quantifying the performance of electric power and supply systems. Voltage sag is a short-duration root-mean-square (rms) voltage variation associated with a reduction in voltage that may cause disruption of the operation of certain types of equipment. Voltage sags are due to short-duration increases in current, typically due to faults, motor starting, or transformer energizing. Voltage-sag events can occur at any location in the power system, with a frequency of occurrence between several times and hundreds of times per year.

This guide provides equivalent methods for computing indices and characteristics concerning voltage swells. A voltage swell is a short-duration increase in voltage. On multiphase systems, a voltage swell in one phase can be associated with a voltage sag in another phase. Some of the methods discussed will classify such an event as both a voltage sag and a voltage swell.

This guide presents methods for quantifying the severity of individual rms variation events, for quantifying the performance at a specific location (i.e., single-site indices), and for quantifying the performance of the whole system (i.e., system indices). Multiple methods are presented for each of these. This guide does not recommend the use of a specific set of indices because the large variation in customers sensitive to voltage sags and in network companies supplying them makes it impossible to prescribe a specific set of indices for all cases. Instead, this guide recommends the method for calculating specific indices when such an index is used. It aims to assist in the choice of index and to help ensure reproducibility of the results after a certain index has been chosen.

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IEEE Guide for Voltage Sag Indices

1. Overview

1.1 Scope

This guide identifies appropriate voltage sag indices and characteristics on electrical power and supply systems as well as the methods for calculating them. Methods are provided for quantifying the severity of individual voltage sag events (single-event characteristics), for quantifying the performance of multiple events at a specific location (single-site indices), and for quantifying the performance of multiple events for the whole system (system indices). The methods are appropriate for use in 50/60 Hz transmission, distribution, and utilization electric power systems, though there may be applications to systems with other fundamental frequencies.

1.2 Purpose

This document identifies and defines different characteristics and indices associated with voltage sags. It does not recommend the use of a specific set of indices but instead recommends the method for calculating specific indices when such an index is used. The large variation in customer equipment's susceptibility to voltage sags and in power providers supply characteristics makes it impossible to prescribe a specific set of indices. Instead, this document aims to assist in the choice of index and to help ensure reproducibility of the results after a certain index has been chosen. The user of this document may decide to calculate the value for just one index or for a number of different indices, depending on the application.