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IEEE Standard for the Specification of Microgrid Controllers

IEEE Power and Energy Society

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Transmission and Distribution Committee

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IEEE Standard for the Specification of Microgrid Controllers

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of the
IEEE Power and Energy Society

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Abstract: A key element of microgrid operation is the microgrid energy management system (MEMS). It includes the control functions that define the microgrid as a system that can manage itself, operate autonomously or grid connected, and seamlessly connect to and disconnect from the main distribution grid for the exchange of power and the supply of ancillary services. The scope of this standard is to address the functions above the component control level associated with the proper operation of the MEMS that are common to all microgrids, regardless of topology, configuration, or jurisdiction. Testing procedures are addressed.

Keywords: distributed energy resources, distributed energy storage, distributed generation, electric distribution systems, energy management system, IEEE 2030.7™, interconnection agreement and requirements, islanding, microgrid, microgrid controller, power quality

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Introduction

This introduction is not part of IEEE Std 2030.7–2017, IEEE Standard for the Specification of Microgrid Controllers.

The technologies and operational concepts to properly integrate and manage microgrids interconnected with existing distribution systems are being deployed. However, to fully realize the benefits and to avoid negative impacts on system reliability, there is a critical need to have a single document of standard technical requirements for microgrid controllers. This standard addresses this need by providing uniform criteria and requirements relevant to the performance and operation of the microgrid controller at the point of the interconnection.

The intent of this standard is to define the functional requirements of the microgrid controller in a manner that can be universally adopted. The universality relates to the technical aspects, while providing a common language for a wide range of stakeholders, e.g., vendors, utilities, energy service companies, developers, codes and standards organizations, regulators and legislators, and governing bodies.

This standard established the criteria and requirements for the microgrid controller at the point of interconnection. It is not a design or application guideline. It provides the minimum functional technical requirements that are universally needed to assure a technically sound operation of the microgrid at the point of interconnection. Any additional requirements should not be implemented to the detriment of the functional technical requirements of this standard.

This standard defines the functional specification of a microgrid controller that shall be tested using IEEE P2030.8™ Draft Standard for Testing of Microgrid Controllers.

Contents

IEEE Standard for the Specification of Microgrid Controllers

1. Overview

1.1 Scope

This standard provides technical specifications and requirements for microgrid controllers. Additionally, there are informative annexes covering the description of the microgrid, the establishment of the functional specification, the structure of the microgrid control functions, and a bibliography. These are for informative purposes only, and can be referred to, but they are not required to be used in conjunction with this standard.

A key element of microgrid operation is the microgrid energy management system (MEMS). It includes the control functions that define the microgrid as a system that can manage itself, operate autonomously or grid connected, and seamlessly connect to and disconnect from the main distribution grid for the exchange of power and the supply of ancillary services. The scope of this standard is to address the technical issues and challenges associated with the proper operation of the MEMS that are common to all microgrids, regardless of topology, configuration, or jurisdiction, and to present the control approaches required from the distribution system operator and the microgrid operator. Testing procedures are addressed. Scenarios and/or use cases for testing are identified in this standard for dispatch function and transition function respectively. These cases shall be tested according to IEEE P2030.8.[1]

1.2 Purpose

The reason for establishing a standard for the microgrid energy management system (MEMS) is to enable interoperability of the different controllers and components needed to operate the MEMS through cohesive and platform-independent interfaces. This approach will allow for flexibility and customization of components and control algorithms to be deployed without limiting potential functionality. Microgrid components and operational solutions exist in different configurations with different implementations. Regardless of whether equipment and software are commercial or custom, components should be interoperable and have interfaces that comply with functional standards defined by the MEMS. The standardization focuses on defining functions and interface configurations that allow modularity and interoperability. It deals with the microgrid controller operation, and defines those aspects that need to be standardized and those that can remain proprietary, while enabling the interoperability with various distributed energy resources (DER) interfaces and facilitating the wide adoption by vendors and utilities. The standard is functionality driven and focuses on a modular approach that enables potential future expansion and features.

[1]Numbers preceded by P are IEEE authorized standards projects that were not approved by the IEEE-SA Standards Board at the time this publication went to press. For information about obtaining drafts, contact the IEEE.