

Essentials of Distributed Generation Systems

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About the Author

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Foreword

Essentials of Distributed Generation Systems provides an overview of the selection, design, and installation of solar photovoltaic, wind turbine, fuel cell, microturbine, and engine-generator power system technologies.

Chapter 1 provides insight into the benefits of distributed generation and describes electric utility companies' use and view of distributed generation. This chapter introduces the goals of distributed generation and the various types of distributed generation technology.

The next five chapters (Chapters 2 through 6) discuss the components of each of the five distributed technologies, their operation, ratings, applications, installation requirements and limitations, as well as guidelines for system sizing and selection of components.

Chapter 7 discusses the operation of an interconnected generation system, where distributed generation systems operate grid-connected in parallel with the electric utility grid. This chapter presents five different configurations of an electrical distribution system, highlights NEC® requirements for grid-connected distributed generation operation, and reviews interconnection requirements found in IEEE 1547 Standard for Interconnecting Distributed Resources with Electric Power System.

Chapter 8 presents utility-interactive power inverters, such as those used for solar photovoltaic and wind power system applications. The chapter outlines the components and operation of utility-interactive power inverters, along with their voltage, current and power ratings, installation requirements, and operational limitations.

Chapter 9 outlines issues related to sizing distributed generation sources, such as site-rating limitations, load characteristics, and unique characteristics of each distributed generation technology which may limit its application. An overview of electric utility billing practices provides an understanding of how distributed generation affects the bottom-line cost of electric power.

The next three chapters (Chapters 10 through 13) focus on the applicable

NEC requirements for conductors, disconnecting means, overcurrent protection, and grounding and bonding. Chapter 10 details the NEC requirements for sizing grounded and ungrounded conductors, considering the temperature ratings and limitations of conductors, and applying adjustment and correction factors used to derate conductor ampacity for the conditions of installation.

Chapter 11 outlines NEC requirements for installing disconnecting means to disconnect and isolate distributed generation sources and related equipment. This chapter also presents requirements for the point of connection of distributed generation.

Chapter 12 presents NEC requirements for overcurrent protection of conductors, equipment, and distributed generation sources, and describes the purpose of ground-fault protection of equipment in general and in distributed generation applications.

Chapter 13 details the NEC requirements for grounding and bonding. This chapter presents the major components of the grounding system, along with installation and connection requirements, and describes separately-derived and non-separately-derived sources and the application of high-impedance grounded-neutral systems.

Together, these chapters provide the framework that owners, engineers, and electricians need to make informed decisions in selecting, designing, and installing distributed generation applications. *Essentials of Distributed Generation Systems* is an essential guide to solar photovoltaic, wind turbine, fuel cell, microturbine, and engine-generator distributed generation technologies.