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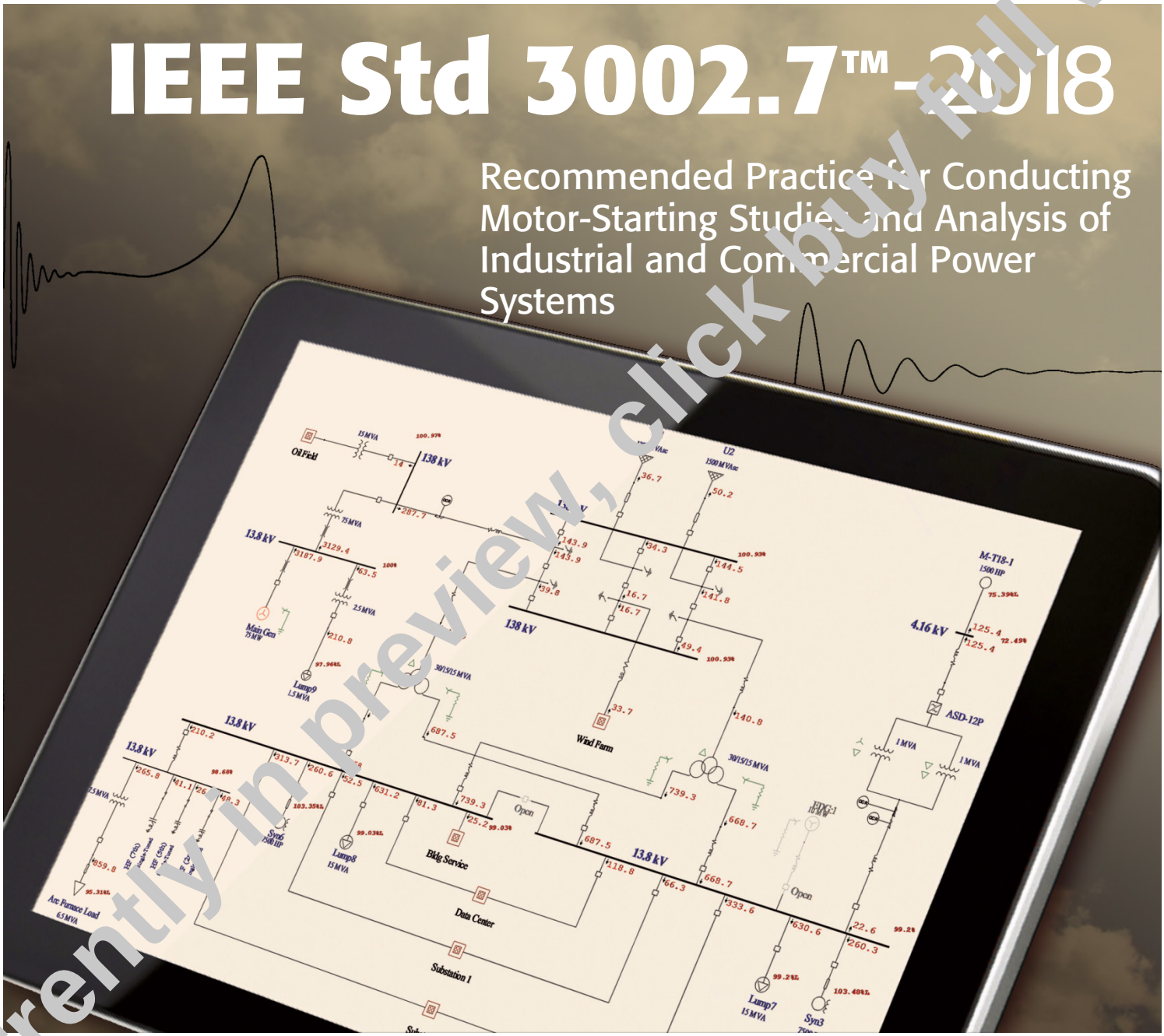
IEEE Std 3002.7™-2018

Recommended Practice for Conducting Motor-Starting Studies and Analysis of Industrial and Commercial Power Systems



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IEEE Recommended Practice for Conducting Motor-Starting Studies and Analysis of Industrial and Commercial Power Systems

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Abstract: Activities related to motor-starting studies, including design considerations for new systems, analytical studies for existing systems, as well as operational and model-validation considerations for industrial and commercial power systems are described. Motor-starting analysis includes evaluation of motor-starting current and voltage drop. Accuracy of calculation results primarily relies on system modeling assumptions and methods used. The use of computer-aided analysis software, with a list of desirable capabilities recommended to conduct a modern motor-starting study, is emphasized. Examples of system data requirements and result-analysis techniques are presented. Benefits obtained from motor-starting studies are discussed, and various types of computer-aided motor-starting studies are examined. Data or information required for these studies, as well as the expected results of a motor-starting study effort, are also reviewed.

Keywords: adjustable speed drive, dynamic motor starting, IEEE 3002.7, motor acceleration, motor protection, motor reacceleration, motor starting, reduced-voltage starters, soft-starters, static motor starting, variable frequency drive, voltage flicker

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Tanuj Khandelwal, *Co-Chair*

Farrokh Shokooh, *Co-Chair*

Paul Cardinal
Jianjun Guo
Jun Qiu
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Aparna Sinha

The following members of the individual balloting committee voted on this recommended practice. Balloters may have voted for approval, disapproval, or abstention.

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Introduction

This introduction is not part of IEEE Std 3002.7-2018, IEEE Recommended Practice for Conducting Motor-Starting Studies and Analysis of Industrial and Commercial Power Systems.

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This recommended practice was developed by the Technical Books Coordinating Committee of the Industrial and Commercial Power Systems Department of the Industry Applications Society, as part of a project to repackage the popular IEEE Color Books®. The goal of this project is to speed up the revision process, eliminate duplicate material, and facilitate use of modern publishing and distribution technologies.

When this project is completed, the technical material included in the 13 IEEE Color Books will be included in a series of new standards—the most significant of which will be a new standard, IEEE Std 3000™, IEEE Recommended Practice for the Engineering of Industrial and Commercial Power Systems. The new standard will cover the fundamentals of planning, design, analysis, construction, installation, startup, operation, and maintenance of electrical systems in industrial and commercial facilities. Approximately 60 additional dot standards, organized into the following categories, will provide in-depth treatment of many of the topics introduced by IEEE Std 3000:

— Power Systems Design (3001 series)

— Power Systems Analysis (3002 series)

— Power Systems Grounding (3003 series)

— Protection and Coordination (3004 series)

— Emergency, Standby Power, and Energy Management Systems (3005 series)

— Power Systems Reliability (3006 series)

— Power Systems Maintenance, Operations, and Safety (3007 series)

In many cases, the material in a dot standard comes from a particular chapter of a particular IEEE Color Book. In other cases, material from several IEEE Color Books has been combined into a new dot standard.

IEEE Std 3002.7

This recommended practice, for the commonly known *IEEE Brown Book*™, is intended as a practical, general treatise on motor-starting analysis and as an engineer's reference source on the techniques that are most commonly applied in the computer-aided motor-starting analysis of electric power systems in industrial plants and commercial buildings. IEEE Std 3002.7™ is a useful supplement to several other power system analysis texts that appear in Clause 2 (Normative reference) and Annex A (Bibliography). IEEE Std 3002.7 is both complementary and supplementary to the rest of the Color Book series.

This recommended practice describes how to conduct motor-starting studies and analysis of industrial and commercial power systems. It is likely to be of greatest value to the power-oriented engineer with limited experience in this area. It can also be an aid to all engineers responsible for the electrical design of industrial and commercial power systems.

All sections have been revised and updated—in some cases quite substantially—to reflect current technology and methodology for the computer simulation of power systems.

To many members of the working group who wrote and developed the original recommended practice, the *IEEE Brown Book* was a true labor of love. The dedication and support of each individual member was clearly evident in every chapter of the *Brown Book* and is also reflected in IEEE Std 3002.7. These individuals deserve our many thanks for their excellent contributions.

Contents

IEEE Recommended Practice for Conducting Motor-Starting Studies and Analysis of Industrial and Commercial Power Systems

1. Overview

1.1 Scope

This recommended practice describes how to conduct motor-starting studies and analysis of industrial and commercial power systems. It is likely to be of greatest value to the power-oriented engineer with limited experience in this area. It can also be an aid to all engineers responsible for the electrical design of industrial and commercial power systems.

2. Normative reference

The following referenced document is indispensable for the application of this document (i.e., it must be understood and used, so it is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

IEEE Std 399™, IEEE Recommended Practice for Industrial and Commercial Power Systems Analysis (*IEEE Brown Book*™).[1, 2]

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