

IEEE Guide for Application of Digital Line Current Differential Relays Using Digital Communication

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IEEE Guide for Application of Digital Line Current Differential Relays Using Digital Communication

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Approved 11 June 2015

IEEE-SA Standards Board

Abstract: A comprehensive guide to practical line current differential schemes using digital communications. Operating principles, synchronization methods, channel requirements, current transformer requirements, external time reference requirements, backup considerations, testing considerations, and troubleshooting are included. This guide also provides specific guidelines for various application aspects including multi-terminal lines, series compensated lines, mutually coupled lines, line charging current, in-zone transformers and reactors, single-phase tripping and reclosing, as well as communications channel requirements.

Keywords: alpha plane, charge comparison, current differential line protection, current differential operating methods, current ration plane, IEEE C37.243™, percentage differential, ping-pong methods, time synchronization

The Institute of Electrical and Electronics Engineers, Inc.
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PDF: ISBN 978-0-7381-9777-7 STD20265
Print: ISBN 978-0-7381-9778-4 STDPD20265

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Introduction

This introduction is not part of IEEE Std C37.243™-2015, IEEE Guide for Application of Digital Line Current Differential Relays Using Digital Communication.

This guide is intended to assist protection engineers and technologists in effectively applying digital current differential relays using digital communications channels and protection systems to protect transmission lines.

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1. Overview

1.1 Scope

This guide presents practical line current differential schemes using digital communications. Operating principles, synchronization methods, channel requirements, current transformer (CT) requirements, external time reference requirements, backup considerations, testing considerations, and troubleshooting are included. It also provides specific guidelines for various application aspects including multi-terminal lines, series compensated lines, mutually coupled lines, line charging current, in-zone transformers and reactors, single-phase tripping and reclosing, as well as communications channel requirements.

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document 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.