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IEEE Guide for Determining Fault Location on AC Transmission and Distribution Lines

IEEE Power and Energy Society

Sponsored by the
Power System Relaying Committee

IEEE
3 Park Avenue
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IEEE Std C37.114™-2014
(Revision of
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Abstract: Electrical faults on transmission and distribution lines are detected and isolated by system protective devices. Once the fault has been cleared, outage times can be reduced if the location of the fault can be determined more quickly. The techniques and application considerations for determining the location of a fault on ac transmission and distribution lines are outlined in this guide. Traditional approaches and the primary measurement techniques used in modern devices are reviewed: one- and two-terminal impedance-based methods and traveling-wave methods. Application considerations include: two- and three-terminal lines, series-compensated lines, parallel lines, untransposed lines, underground cables, fault resistance effects, and other power system conditions, including those unique to distribution systems.

Keywords: fault location, IEEE C37.114™, relays, synchrophasor, system protection, travelling waves

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Introduction

This introduction is not part of IEEE Std C37.114-2014, IEEE Guide for Determining Fault Location on AC Transmission and Distribution Lines.

This guide outlines the techniques and application considerations for determining the location of a fault on ac transmission and distribution lines. The guide reviews traditional approaches and the primary measurement techniques used in modern devices: one- and two-terminal impedance-based methods and traveling-wave methods. Application considerations include: two- and three-terminal lines, series-compensated lines, parallel lines, untransposed lines, underground cables, fault resistance effects, and other power system conditions, including those unique to distribution systems.

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IEEE Guide for Determining Fault Location on AC Transmission and Distribution Lines

1. Overview

1.1 Scope

This guide outlines the techniques and application considerations for determining the location of a fault on ac transmission and distribution lines. This document reviews traditional approaches and the primary measurement techniques used in modern devices: one- and two-terminal impedance-based methods, synchronized sampling methods and traveling-wave methods. Application considerations include: two- and three-terminal lines, series-compensated lines, parallel lines, untransposed lines, tapped lines, underground cables, fault resistance effects, and other power system conditions, including those unique to distribution systems.

1.2 Purpose

The guide assists power system engineers and operators in applying fault-locating techniques on their systems. Users learn the strengths and limitations of fault location data and when further analysis is required using additional methods and when more data must be gathered. This guide assists in fault location and therefore faster restoration of power systems through improved understanding of fault-locating techniques.