

Long-distance relay protection principle

Article Overview

Long-distance relay protection operates by measuring the apparent impedance between the relay location and a fault, tripping the circuit if the impedance falls below a preset threshold.

Basic Principle

Long-distance or distance relays (also called impedance relays) protect transmission lines by detecting faults based on the electrical impedance between the relay and the fault point. The relay continuously measures the voltage and current at its location and calculates the apparent impedance using the formula $Z=V/I$ (). If the measured impedance is less than the relay's preset reach impedance, it indicates a fault within the protected zone, and the relay sends a trip signal to isolate the faulty section ().

Fault Detection Mechanism

- Voltage and current inputs are obtained from voltage transformers (VTs) and current transformers (CTs) installed on the line ().
- The relay calculates the apparent impedance for each fault loop, including phase-to-phase and phase-to-ground faults ().
- The relay compares the measured impedance with the known line impedance. A lower measured impedance indicates a fault within the relay's protection zone ().

Zone-Based Protection

Distance relays are typically configured with multiple zones:...

Article Content

May 12, 2026

Distance Relay: Types, Diagrams, and Working Principles

Unlike traditional overcurrent relays which trip in any condition resulting in excessive current, offering no speed or

Oct 01, 2025

Distance Relay - Definition, Working Principle, Formula, Derivation ...

A distance relay (or impedance relay) is a protection device used on power transmission lines that estimates the

Nov 05, 2025

What is a Distance Relay : Working & Its Applications

The distance relay is also referred to as the impedance relay or distance protection element or voltage-controlled device. It's working

Jul 17, 2026

Distance Relay Element Design

Numerical techniques are the newest way to implement distance and directional relay elements. These relays use torque-like

Jun 12, 2026

What is Distance Protection Relay? Description & its Application ...

Distance protection relay is the name given to the protection, whose action depends on the distance of the feeding point to the fault.

May 05, 2026

Transmission Line Distance Relay Protection

The distance protection scheme is widely employed for the protection of very long high voltage transmissions lines

Nov 15, 2025

(PDF) Fundamentals of Distance Protection

In this paper we have reviewed some basic principles of distance protection. This includes fundamentals of measuring

Sep 18, 2025

Practical handbook for relay protection engineers | EEP

Relay protection circuitry This handbook covers the code of practice in protection circuitry including standard lead and

Jan 23, 2026

Distance Relaying Essentials

Principles of Distance Relay Setting and Coordination Distance relay setting involves determining the impedance

Oct 04, 2025

How do distance relays work in transmission line protection?

Detailed Explanation: Distance Relays in Transmission Line Protection In power systems, especially long

Nov 03, 2025

What is a Distance Relay: Working Principle, types & Applications

What is a Distance Relay? A distance relay is a type of protective relay used primarily for the protection of high

Feb 12, 2026

Distance Relaying for the Protection of Modern Power System Networks

Distance relays (DRs) have long been considered one of the most reliable protection schemes for transmission lines

May 14, 2026

Principles and Characteristics of Distance Protection

The basic principle of distance protection involves the division of the voltage at the relaying point by the measured

Apr 28, 2026

Distance Protection Fundamentals Guide | PDF | Electrical Impedance | Relay

This document provides an overview of fundamentals of distance protection for transmission lines. It discusses key concepts such as

Aug 26, 2025

Distance Protection Working Principle & Fault Location Detection

Distance Protection Relays Working Principle: In last study we have discussed about only current or voltage based relay. Now we

Apr 09, 2026

Distance Protection of Transmission Line: Working Principle, Zone 1, 2 ...

Unlike overcurrent relays that operate based solely on current magnitude, distance relays measure the impedance

Nov 22, 2025

Distance Relay | How it works, Application & Advantages

This article delves into the working principles, types, and applications of distance relays in power system protection.

Nov 09, 2025

Fundamentals of Distance Protection

The principle of distance protection is based on the determination of the fault impedance from the measured short-circuit voltage and

Jul 04, 2026

Distance Protection | Principle | Operation | Applications

This has led to the development of Distance Protection in which the action of relay depends upon the distance (or impedance)

Aug 13, 2025

Distance Relay : Working Principle, Characteristics & Its Classification

A distance relay is a fundamental device that trips the circuit breaker in the event of a fault. In low rating power

Oct 25, 2025

BASIC PRINCIPLES OF DISTANCE PROTECTION DEVICES1

BASIC PRINCIPLES OF DISTANCE PROTECTION DEVICES1 The operating voltage of the lines and equipment protected by

Sep 23, 2025

Distance Protection | Principle | Operation | Applications

The principle and operation of Distance Protection relays have already been discussed here. We shall now consider its application

Jun 15, 2026

Power System Protection Professor A. K. Pradhan Department of ...

Power System Protection Professor A. K. Pradhan Department of Electrical Engineering Indian Institute of Technology, Kharagpur

Sep 18, 2025

Welcome to Eastern Regional Power Committee ::

Hier sollte eine Beschreibung angezeigt werden, diese Seite lässt dies jedoch nicht zu.

Sep 29, 2025

Distance Relay or Impedance Relay

Hence a distance relaying system is well suited for the protection of long transmission lines.

Nov 27, 2025

Protective Relaying Principles and Applications

Protective Relaying Principles and Applications The article provides an overview of protective relaying principles and their

Dec 13, 2025

Relays Part 6: Distance Relays Important Theory

Advantages of the distance relays include providing quick protection, being easy to coordinate and use, having less

Oct 24, 2025

Distance Relay or Impedance Relay Working Principle Types

There is one type of relay which functions depending upon the distance of fault in the line. More specifically, the relay

May 02, 2026

Distance Protection Working Principle & Fault Location Detection

These relays are called as distance protection relays. The relay operation is purely depending upon the magnitude of the circuit

Feb 08, 2026

Distance Relay – Definition, Working Principle, Formula, Derivation ...

Operating Principle Derivation Types Comparison Table Advantages / Disadvantages Applications 1. Definition of

Contact Us

For more information, pricing, or custom solutions, please contact us:

Website: <https://www.iiss.co.za>

Email: sales@iiss.co.za

Phone: +27 63 174 2895

Address: Unit 8, Innovation Park, 15 Rivonia Road, Sandton, Johannesburg,
2196, South Africa

This document is for informational purposes only. Specifications subject to
change without notice.

