

Calculation of Electrical Relay Protection



Article Overview

Relay protection settings are calculated by determining the pickup current, time multiplier, and coordination parameters to ensure selective and reliable fault isolation.

Key Parameters for Relay Settings

- Plug Setting Multiplier (PSM): Represents how many times the actual current exceeds the relay's pickup current. It is used in inverse time relays to determine operating time based on the relay's characteristic curve. Higher PSM results in faster tripping ().
- Time Setting Multiplier (TSM): Scales the base operating time from the relay curve. It allows coordination between upstream and downstream relays, ensuring the downstream relay trips first while the upstream relay provides backup ().
- Overload (OL) and Earth Leakage (EL) Settings: OL protects against thermal overloads, while EL or earth fault settings detect ground faults. These are set based on maximum load currents and expected fault levels ().
- Multiplying Factor (MF): Used to scale metering or CT secondary currents to match relay input requirements ().

Step-by-Step Calculation Process

- Determine Fault Currents: Calculate the maximum and minimum short-circuit currents at each relay location using system data, CT ratios, and line impedances ().
- Set Pickup Current:
 - For overcurrent relays, set the pickup current above the maximum load but below the minimum fault current to ensure selectivity.
- Formula: $I_{pickup} = I_{load} \times \text{SafetyMargin}$ ()....

Article Content

Jul 04, 2026

Relay Protection in HV/MV Substations: Calculations, Settings ...

This comprehensive article delves into the key aspects of relay protection in HV/MV substations, including calculations,

Sep 01, 2025

Protection Basics

Protection System Elements Protective relays Circuit breakers CTs and VTs (instrument transformers) Communications channels

Aug 16, 2025

Section2_EP3

Fundamentals of power system protection Key electrical system protection techniques including fault analysis How to calculate basic

Jan 08, 2026

Relay Coordination Study: Selectivity Calculations | EEP

The scope of study involves calculating the settings for protective relays to achieve selectivity during faults occurring in

Jul 31, 2025

Mastering Distance Protection and Calculations: Never Mess Up ...

Deep understanding of the nuanced factors that influence distance protection accuracy, contributing to reliable power

Nov 12, 2025

A Guide for Calculating Step Distance Relay Settings

Calculating & Storing Relay Setting Philosophy Utilities can use a Word document or spreadsheets to document the step-by-step

Nov 06, 2025

Distribution Automation Handbook

When the protection is implemented using a voltage relay, the selected setting must be equal to or exceed the calculated stabilizing

Jan 29, 2026

Types of Electrical Protection Relays or Protective Relays

□□ Key learnings: Protective Relay Definition: A protective relay is an automatic device that senses abnormal conditions

Oct 30, 2025

Over Current Relay Setting Calculator

Our Overcurrent Relay Setting Calculator will accurately calculate your overcurrent relay settings. Enter rated current,

Nov 11, 2025

Setting Calculation Method and Protection Coordination for Relay ...

Then, the electrical engineering software is used to perform a more accurate setting calculation and protection coordination. Also, the

Nov 06, 2025

RELAY SETTING CALCULATION

To determine stability voltage for through fault V_s'' Voltage across the relay at IFS (VS) CT Resistance (RCT)

Feb 01, 2026

Setting the generator protective relay functions

Protective relay functions and data This technical article will cover the gathering of information needed to calculate

Sep 08, 2025

Free Protection Coordination Calculator | ELEK Software

Free Protection Coordination Calculator with Time-Current Curves, Manufacturers Database, Adjustable Device Settings, and

Jun 17, 2026

FEEDER PROTECTION CALCULATIONS & SETTINGS

Relay 8 backs up relays 6 and 7, and should be co-ordinated with the slowest of these two relays. Relay 7 has an instantaneous

Sep 25, 2025

Relay Protection in HV/MV Substations: Calculations, Settings ...

Introduction Relay protection is essential to ensure the stability, reliability, and safety of electrical power systems. In

Jun 02, 2026

Protection Relay Setting Interactive Calculator | FIRGELLI

With this Protection Relay Setting Calculator, you'll be able to work out pickup current, time multiplier settings (TMS),

Mar 26, 2026

CALCULATION AND SETTING OF RELAYS IN TRANSMISSION

The proposal itself and define the different protection zones should be based on impedance lines to be determined by the calculation

May 04, 2026

Protection Relay Coordination calculation for Electrical Engineering

Popularity: ☐☐☐ Protection Relay Coordination in Electrical Engineering This calculator provides the calculation

Feb 07, 2026

Pick Up Current | Current Setting | Plug Setting Multiplier and Time ...

When studying electrical protective relays, we often use specific terms. To understand how different protective relays

Aug 21, 2025

Distribution Automation Handbook

When the protection is implemented using a current relay, the current value at which the relay should operate must be determined

Nov 01, 2025

(PDF) Relay Protection Setting Calculation of Power ...

Therefore, the setting calculation method of the power transformer relay protection based on the Electrical Transient

Mar 04, 2026

POWER SYSTEM PROTECTION AND RELAY COORDINATION

Power System Protection philosophies Short-circuit calculations (Ohmic Methodology / Per Unit Calculation (IEC 60909/ IEEE 242

Apr 09, 2026

Relay Settings Calculations - Electrical Engineering

This technical report refers to the electrical protection of all 132kV switchgear. These settings may be re-evaluated during the

Oct 10, 2025

Relay Settings Calculations

Introduction This technical report refers to the electrical protections of all 132kV switchgear. All calculations are based on the

Contact Us

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