

What is the relay protection factor



Overview

Protection relays employ a wide range of configurable parameters to identify defects & trip the breaker in a controlled & selected manner.

Key Takeaways

The relay protection factor quantifies how effectively a protective relay detects and isolates faults, often expressed through parameters like the Plug Setting Multiplier (PSM) and Multiplying Factor (MF).

Definition and Purpose

The relay protection factor is a measure of a relay's sensitivity and effectiveness in responding to fault currents. It indicates how much the actual fault current exceeds the relay's pickup setting, helping engineers determine the relay's operating speed and selectivity. This factor ensures that only the faulty section of the system is isolated, minimizing disruption to the rest of the network.

Key Parameters Influencing Relay Protection Factor

Plug Setting Multiplier (PSM): Represents how many times the actual current exceeds the relay's pickup current. A higher PSM results in faster relay operation according to the inverse definite minimum time (IDMT) curve. **Time Setting Multiplier (TSM):** Scales the base operating time derived from the relay's characteristic curve, allowing coordination between upstream and downstream relays.



Lower TS

M values lead to faster tripping. Multiplying Factor (MF): Adjusts the relay's internal measurements to match actual primary system values, compensating for CT/PT ratios and measurement losses.

Role in Protection Coordination

The relay protection factor is critical for selectivity, ensuring that only the closest relay to a fault trips while upstream relays act as backup. Proper calculation prevents overreaching or underreaching, which could either leave faults uncleared or cause unnecessary outages. It also helps in defining the pickup current and operating time for overcurrent and earth-fault relays, ensuring reliable and safe operation of the power system.

Practical Application

In practice, engineers use the relay protection factor to: Determine pickup currents for overcurrent and ground fault relays. Set time-current characteristics for inverse-time relays. Ensure coordination between multiple relays along a feeder or transmission line.

Compensate for CT/PT ratios and system measurement inaccuracies using the MF. By carefully adjusting these parameters, the relay protection factor ensures fast, reliable, and selective fault isolation, maintaining system stability and minimizing service interruptions.

Article Content

Relay Protection Settings (PSM, TSM, EL, OL, MF)

Protection relays employ a wide range of configurable parameters to identify defects & trip the breaker in a controlled & selected manner. Understanding each setting facilitates proper relay

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When the relay determines that a condition exceeds its settings or logic requirements, it sends an output signal to trip a circuit breaker, alarm an operator, block an operation, or start another

Power System Protective Relays: Principles & Practices

(of a relay) The extent of the protection afforded by a relay in terms of the impedance or circuit length as measured from the relay location. Note: The measurement is usually to a point of fault, but excessive

Basic protection relay knowledge

Protection is needed to detect electrical faults and abnormal operating conditions. Protection is also needed for protecting people and property around the power network. The protected zone is the part

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Protection Basics

Ground fault protection for these systems is usually provided by residual protection, either calculated by relay or by external CT residual connection to IN input

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The most important requisite of the protective relay is reliability since they supervise the circuit for a long time before a fault occurs. If a fault then occurs, the relays must respond instantly

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When the protection is implemented using a current relay, the current value at which the relay should operate must be determined first. By means of the stabilizing voltage and the current setting, the

FEEDER PROTECTION CALCULATIONS & SETTINGS

Relay coordination is the process of selecting settings that will assure that the relays will operate in a reliable and selective way. In OC relays the coordination is based on the relay time-current

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Basics of Protective Relaying and Design Principles

Rules for protecting a network using overcurrent relays. Requirements for instrumentation (number and locations of instrument transformers) and switching apparatus (number and locations of circuit

Introduction to Protective Relaying | Electric Power

Introduction to Protective Relaying What are Protective Relays, or Protection Relays? Protective relays are used in industrial power generation and supply

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Time-graded protection is implemented using overcurrent relays with either definite time characteristic or inverse time characteristic. The operating time of definite time relays does not depend on the

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