

How to select relay protection setting values

Article Overview

Relay protection values are set by calculating the pickup current, time multiplier, and coordination parameters to ensure selective and reliable fault isolation.

Key Parameters for Relay Settings

- o Plug Setting Multiplier (PSM) PSM determines how many times the actual fault current exceeds the relay's pickup current. It is crucial for IDMT (Inverse Definite Minimum Time) relays to calculate operating time. Formula: $PSM = \text{Fault Current} / \text{Pickup Current}$ Example: For a CT of 400/5 A, plug setting 120%, and fault current 10 A (secondary), $\text{Pickup} = 1.2 \times 5 = 6 \text{ A}$, $PSM = 10 / 6 = 1.67$. Higher PSM results in faster relay operation .
- o Time Setting Multiplier (TSM) TSM scales the base operating time from the relay's characteristic curve. It ensures proper coordination with downstream relays. Typical Values: Motor protection: 90-110% of FLA; Transformer protection: 110-130% of rated current . Formula: $\text{Operating Time} = \text{Base Time} \times \text{TSM}$
- o Earth Leakage / Earth Fault Setting (EL) EL defines the threshold current at which the relay detects ground faults. It is often expressed as a percentage of CT primary or a secondary current value. Typical Values: LV systems: 30 mA-1 A; Industrial LV: 10-50 A; MV relays: 10-40% of CT primary . Purpose: Detects single-phase-to-earth faults that phase overcurrent relays may miss.
- o Overcurrent / Pickup Current Setting The pickup current is the minimum current at which the relay operates. It is usually set above the maximum load current to avoid nuisance tripping. Formula: $I_{pu} = \text{Rated CT output} \times \% \text{Current Setting}$.

Steps to Set Relay Protection Values

- o Determine System Parameters
 - o Maximum load current, minimum fault current, CT ratios, and system voltage levels .
- o Select Relay Type and Characteristic Curve
 - o Choose IDMT, very inverse, extremely inverse, or definite time based on application .
- o Calculate Pickup Current
 - o Set above maximum load but below minimum fault current to ensure selectivity .
- o Compute PSM and TSM
 - o Use fault current and relay curve to determine PSM.
 - o Adjust TSM to coordinate with downstream relays, ensuring proper time grading .
- o Set Earth Fault / Leakage Values
 - o Determine EL based on system sensitivity requirements and CT ratings .

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- o Verify Coordination and Selectivity
 - o Ensure upstream relays operate after downstream relays for the same fault.
 - o Use coordination time interval (CTI) to maintain proper delay between relays .
- o Test and Validate
 - o Perform secondary injection tests or simulation to confirm relay operation under fault conditions .

Practical Tips

- o Always follow IEC standards (IEC 60255 series) for relay performance and IDMT characteristics .
- o Document all settings and maintain a relay coordination study for future reference.
- o Re-evaluate settings during commissioning or after system modifications . By carefully calculating and coordinating PSM, TSM, pickup current, and earth fault settings, relays can protect equipment effectively while maintaining system reliability and selectivity.

Learn how to set overcurrent protection relay settings with a clear, step-by-step guide. Understand pickup settings,

Overcurrent Relay Setting Calculator based on IEC 60255 and IEEE C37.112 standards. Calculate pickup current, time

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

Abstract-- Adaptive relaying utilizes the continuously changing status of the power system as the basis for online adjustment of the

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Maximum value on secondary is $15250 / 250 = 61$ Earth fault relay for the Transformer Neutral CT Ratio 250 / IA 100 to 2000ms Set

Perform power system simulations of selected faults and observe how a given protection principle (overcurrent, impedance, and

Plug setting multiplier of relay is referred as ratio of fault current in the relay to its pick up current. Suppose we have

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Traditionally, protective relays were electromechanical devices utilizing induction disk, coils, contacts, and solenoid elements to

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

1) The document discusses how to set the inverse definite minimum time (IDMT) characteristics of phase overcurrent protection for a

Learn how to ensure proper set-up of protective relays for power systems by following these steps: identify the protection scheme,

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

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

Conclusion Relay coordination and settings lie at the heart of ensuring a stable and reliable electric power generation system. For the

For engineers and protection specialists In this technical article, we will delve into the comprehensive methodology of

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