Calculation Method for Electrical Relay Protection Settings

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

o 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 ( ).

o 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 ( ).

o 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 ( ).

o Multiplying Factor (MF): Used to scale metering or CT secondary currents to match relay input requirements ( ).

Step-by-Step Calculation Process

o Determine Fault Currents: Calculate the maximum and minimum short-circuit currents at each relay location using system data, CT ratios, and line impedances ( ).

o Set Pickup Current:

o For overcurrent relays, set the pickup current above the maximum load but below the minimum fault current to ensure selectivity.

o Formula: Ipickup=IloadxSafetyMargin ( ).

o Calculate Plug Setting Multiplier (PSM):

o PSM=IfaultIpickup

o This determines the operating point on the relay's inverse time curve ( ).

o Select Time Multiplier Setting (TMS):

o Use the relay's characteristic curve (Standard Inverse, Very Inverse, Extremely Inverse) to calculate operating time:

o t=TMSxf(PSM)

o Adjust TMS to achieve proper coordination with downstream relays, maintaining a coordination time interval (CTI) of typically 0.2-0.5 seconds ( ).

o Check Coordination:

o Ensure that the upstream relay trips after the downstream relay for faults in the downstream zone.

o Operating time of upstream relay: tupstream=tdownstream+tmargin ( ).

o Verify Instantaneous Settings:
o Instantaneous elements should be set above the maximum load but below the minimum fault current at the bus or protected element to avoid nuisance tripping ( ).

o Adjust for Special Cases:
o For distance relays, set zone reaches (e.g., 80-90% of line impedance) and apply zero-sequence compensation for ground faults ( ).

Practical Considerations

o Use numerical relay features to set definite time or inverse time characteristics.
o Always validate settings with system studies and adjust during commissioning based on measured currents.
o Follow IEC 60255 standards for overcurrent relay performance and coordination ( ). By following these steps, relay settings can be calculated to provide selective, reliable, and safe protection for electrical networks, minimizing equipment damage and service interruptions.

This document discusses distance protection relay setting calculations. It provides the following key points: 1. Distance protection

Calculated (for settings that have not yet been implemented in the relay) In operation (relay files (dex, pcmp, etc.)) Protection setting

This document provides calculations for setting protection relays for a distribution transformer with three windings. It includes: 1) Data

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

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

SID The calculated settings are tabulated in a schedule and co-ordination curves demonstrating grading for the over current

The document discusses overcurrent protection calculations and settings for a power system network. It provides a single line

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

Development of new methods of automated coordination of traditional step-type protection and multidimensional

ResearchGate

Relay setting plays an important role in maintaining the reliability of a Power System. Read this blog to find out more

Therefore, an automatic calculation method and system for relay protection setting in new energy station suitable for large-scale

Effective relay protection in HV/MV substations requires a thorough approach encompassing calculations, precise

Learn about the best methods and tools to choose the right settings for power system protection relays, and improve your network

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

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

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