What is relay protection setting calculation

Article Overview

Relay protection settings are calculated by determining the pickup current, plug setting multiplier (PSM), and time setting multiplier (TSM) to ensure selective and timely tripping of circuit breakers during faults.

Key Parameters in Relay Settings

Pickup Current (Ip): This is the minimum current at which the relay begins to operate. It is usually set above the maximum load current to avoid nuisance tripping. For example, if the load current is 150 A and the CT primary rating is 200 A, the pickup may be set at 125% of load, giving 187.5 A, and then rounded to the nearest standard plug setting, e.g., 250 A . Plug Setting Multiplier (PSM): PSM is the ratio of the actual fault current in the relay to its pickup current. It determines how fast the relay operates according to the inverse definite minimum time (IDMT) curve. A higher PSM results in faster tripping . Time Setting Multiplier (TSM): TSM scales the base operating time derived from the relay's characteristic curve. It is used to coordinate upstream and downstream relays, ensuring that the relay closest to the fault trips first while backup relays operate with a delay . Operating Time (t): The actual time for the relay to trip is calculated using the IDMT curve, which depends on PSM and TSM. The general formula is: t = TMS x f(PSM) where f(PSM) is the time from the relay's characteristic curve for the given PSM . Coordination Time Interval (CTI): This is the intentional time difference between the operation of downstream and upstream relays to ensure selectivity. It is typically a few hundred milliseconds to allow the nearest relay to clear the fault first .

Steps for Relay Setting Calculation

o Determine Load and Fault Currents: Identify the maximum load current and expected fault currents for the protected section.
o Set Pickup Current: Choose a pickup current slightly above the maximum load to avoid false tripping.
o Calculate PSM: Divide the fault current at the relay location by the pickup current.
o Select TSM: Adjust TSM to coordinate with downstream relays, ensuring proper grading.
o Verify Operating Time: Use the relay's IDMT curve to confirm that the relay trips within the desired time for the given fault current.
o Check Coordination: Ensure that upstream relays operate after downstream relays, maintaining selectivity and avoiding unnecessary outages.

Practical Considerations

o Relay Curve Selection: Standard inverse, very inverse, extremely inverse, or long-time inverse curves are chosen based on system requirements .
o Zone Settings for Distance Relays: For transmission lines, zone 1 reach is typically 80-90% of line impedance, zone 2 includes adjacent line impedance with a time delay, and zone 3 covers the longest line with

additional delay .
o IEC Standards Compliance: Settings should comply with IEC 60255 for overcurrent relays, ensuring proper performance and coordination . By carefully calculating pickup current, PSM, TSM, and coordination intervals, protective relays can isolate faults efficiently, protecting equipment while maintaining system stability.

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

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

PSM and TMS Settings are used to specify the tripping limits of a relay when a fault occurs. How to calculate the

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

For two-terminal lines where the remote station is a ring bus or breaker-and-one-half scheme including breaker failure protection, set

, back-up protections) for protection relays instal o the protection sub-committee was to prepare model setting calculations for typical

Protection Settings The documents presented should serve as a model to various utilities in preparing similar

With the continuous expansion of the power grid scale and the extensive integration of new energy, the operation mode of the

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

Calculate thermal overload, overcurrent, ground fault, and differential relay settings with

ResearchGate

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

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

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

Interactive calculator for power system protection relay settings. Determine optimal pickup current, time multiplier

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