Steps for calculating relay protection settings

Article Overview

Relay protection settings are calculated by determining the appropriate pickup current, plug setting multiplier (PSM), and time multiplier setting (TMS) based on system parameters, fault levels, and relay type.

Step 1: Gather System and Equipment Data

Before calculating settings, collect the following information:

o Line or transformer ratings: voltage, current, impedance, and MVA ratings ( ).
o Motor or load data: full-load current, service factor, and locked rotor current for motor protection ( ).
o Current transformer (CT) ratios and system grounding method ( ).
o Fault levels at the relay location, including phase and ground fault currents ( ).

Step 2: Determine Pickup Current

The pickup current is the minimum current at which the relay operates:

o For overcurrent relays, set the pickup above normal load but below fault current. Typically, 115-125% of motor full-load amps for thermal protection ( ).
o For distance relays, set the Zone 1 reach to 80-90% of the line impedance to avoid overreaching ( ).
o Use the formula: I_pickup = PSM x CT rated secondary current ( ).

Step 3: Calculate Plug Setting Multiplier (PSM)

The PSM defines how many times the relay pickup current corresponds to the fault current:

o PSM = Fault current / Relay pickup current ( ).
o Adjust the plug setting to ensure the relay operates for faults within its designated zone while avoiding nuisance tripping.

Step 4: Set Time Multiplier Setting (TMS)

The TMS adjusts the relay operating time:

o Determine the operating time from the relay's time-current characteristic curve based on PSM ( ).
o Multiply the time obtained from the curve by the TMS to get the actual relay operating time: Operating time = Time from PSM curve x TMS ( ).

o Ensure coordination with upstream and downstream relays to maintain selectivity.

Step 5: Verify and Adjust Settings

o Check for overreach in distance relays and adjust Zone 2 or Zone 3 timers accordingly ( ).
o For motor protection, ensure instantaneous pickup exceeds 1.7 times locked rotor current to prevent nuisance trips ( ).
o Include resistive and arc resistances in calculations for accurate impedance-based settings ( ).
o Review settings using simulation or software tools like SARA to minimize errors ( ).

Step 6: Document and Commission

o Record all calculated settings, including PSM, TMS, and pickup currents.
o Re-evaluate during commissioning based on actual measured values and system conditions ( ).
o Ensure protection selectivity and coordination with other relays in the system. By following these steps, relay protection settings can be accurately calculated to ensure reliable fault detection, system safety, and minimal disruption to normal operation.

This document contains settings for various protection functions in a relay configuration file and power system data. It includes

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

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

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

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

Describe the calculation process for resistive reach settings in distance protection relays for different types of faults. In distance

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Steps for calculating relay protection settings

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

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

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

During external faults, the relay changes to high-security mode and switches from Slope 1 to Slope 2 to avoid relay mal-operation

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

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If in the following settings, the relay overreaches the Zone 2 of any of the remote lines, then the relay must be time coordinated 18

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

Abstract: Protective relays and devices have been developed over 100 years ago to provide "last line" of defense for the electrical

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