

How to shorten the relay protection time



Overview

This cuts the supply from the load for a short duration of time which is equal to switching time of the relay.

Key Takeaways

Relay operating time can be shortened by adjusting time-current characteristics, increasing pickup current, or using inverse time relays with higher fault currents. Key Methods to Reduce Relay Operating Time



1. Use Inverse Time Relays: Inverse time relays operate faster at higher fault currents. Switching from definite time relays to extremely or very inverse time relays can significantly reduce operating time for high-magnitude faults while maintaining selectivity in radial networks (). 2. Adjust Time Multiplier Settings (TMS): The TMS controls how quickly a relay trips after detecting a fault. Lowering the TMS reduces the operating time. For numerical relays, TMS can be fine-tuned to achieve faster response without compromising coordination with upstream relays (). 3. Increase Pickup Current or Plug Setting Multiplier (PSM): The pickup current is the threshold at which the relay starts operating. Raising the pickup current slightly ensures the relay responds faster to actual fault currents. The PSM also affects operating time; higher PSM values reduce the time for the relay to trip at a given fault current (). 4. Optimize Coordination Time Interval (CTI): Ensure that the coordination margin between downstream and upstream relays is minimized but sufficient to maintain selectivity. Reducing unnecessary CTI allows the relay closest to the fault to operate faster while still providing backup protection (). 5. Select Appropriate Relay Characteristics: Choosing the right time-current curve (Standard Inverse, Very Inverse, Extremely Inverse, or Long Time Inverse) affects operating speed. For feeders with high fault currents, extremely inverse curves provide faster tripping at high currents while maintaining coordination ().

Practical Considerations

- Always verify that the short-circuit withstand capacity of network components is not exceeded when reducing operating time ().
- For electromechanical relays, the mechanical travel distance and coil force also influence operating time; adjusting the time setting multiplier can compensate for these factors ().
- Numerical relays allow precise adjustments of TMS, PSM, and instantaneous elements, enabling faster operation without compromising system protection (). By combining these methods—using inverse time characteristics, adjusting TMS and PSM, and optimizing coordination intervals—you can effectively shorten relay operating time while maintaining selective and reliable protection.

Article Content

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Introduction to Protective Relaying | Electric Power Measurement and ...

The relay shown in the above photograph has already been drawn out of its case for inspection. Electronic Protection Relays Later

6 different types of relaying schemes to protect the EHV and UHV ...

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Line Protection Operate Time; How Fast Shall It Be?

The relay operate time is a relatively small part of the required improvement, since the circuit breaker interrupting time

Basics of Protective Relaying and Design Principles

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Overcurrent Protection Fundamentals R

OVERCURRENT PROTECTION FUNDAMENTALS Relay protection against high current was the earliest relay protection

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Relay - Relay coordination requires (1) that there be a minimum of 0.25 to 0.40 seconds time margin between the relay curves at the

Improving Breaker Failure Clearing Times

Operating time of circuit breakers Recent technology advances, including faster protection algorithms, faster output

7 Core Concepts on Relay Coordination Basics: A Simple Guide to ...

The "Whats" and "Whys" of power system protection. An overview of power system protection with focus on relay coordination basics -

Basic protection relay knowledge

A fast and selective arc fault mitigation for air-insulated LV & MV switchgear and Relion protection and control relays and sensor

Instantaneous and Time-overcurrent (50/51) Protection

How Does Instantaneous and Time-Overcurrent Protection Work? Overcurrent protection prevents damage from the overheating of

The Basics Of Overcurrent Protection

The basic element in overcurrent protection is an overcurrent relay. The ANSI device number is 50 for an

PSM and TMS Settings Calculation of a Relay: Protection

PSM and TMS settings that are Plug Setting Multiplier and Time Multiplier Setting are the settings of a relay used to

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