

Selection of inverse time curve for relay protection



Overview

Inverse Time Overcurrent Relays and Curves Explained The time it takes for the relay to trip will vary depending on the curve slope. These curves IEC Overcu.

Key Takeaways

The selection of an inverse time curve for relay protection depends on fault current levels, coordination with downstream devices, and the desired speed of operation, using standard IDMT curves such as Standard Inverse, Very Inverse, Extremely Inverse, or Long-Time Inverse. Understanding Inverse Time Relays

Inverse time overcurrent relays operate with a time delay inversely proportional to the magnitude of the fault current: higher currents cause faster tripping, while lower currents result in slower operation. These relays are adjustable via:

- Pickup current (I_s): the minimum current at which the relay starts timing.
- Curve type: determines the slope of the time-current characteristic.
- Time multiplier setting (TMS or TD): scales the operating time for coordination purposes.

Standard IDMT Curve Types

IEC 60255-151 defines four common IDMT curve families:

- Standard Inverse (SI): moderate slope, suitable for general protection.

- Very Inverse (VI): steeper slope, faster operation at high fault currents.
- Extremely Inverse (EI): very steep, ideal for high fault current ratios.
- Long-Time Inverse (LTI): slower response, used for backup protection or high inrush currents . IEEE C37.112 provides equivalent curves with slightly different equations but similar shapes .

Criteria for Curve Selection

- Fault Current Range: Determine the maximum (I_{sc_max}) and minimum (I_{sc_min}) fault currents in the protected zone. Steeper curves (VI or EI) are preferred when the ratio I_{sc_max}/I_{sc_min} is high to ensure fast clearing of severe faults .
- Coordination with Downstream Devices: Ensure selectivity by maintaining a grading margin (CTI) between upstream and downstream relays. The upstream relay's operating time must exceed the downstream relay's time plus the CTI (e.g., 0.3 s for numerical relays, 0.4 s for electromechanical relays), .
- System Characteristics: Consider load inrush, transformer magnetizing currents, and cable lengths. Slower curves (SI or LTI) may prevent nuisance tripping during normal transient conditions .
- Relay Settings: Adjust Plug Setting Multiplier (PSM) and Time Setting Multiplier (TSM) to fine-tune the operating time according to the selected curve and fault current levels .

Practical Implementation

- Digital relays allow programmable curve selection and easy adjustment of TMS, PSM, and minimum operate time, providing flexibility for coordination studies .
- Electromechanical relays require physical replacement to change the curve type, making initial selection critical .
- Minimum operate time or IDMT Sat point can be used to level out the curve at very high currents, preventing excessively fast tripping beyond the relay's guaranteed range .

Summary

Selecting the appropriate inverse time curve involves balancing speed of fault clearance, coordination with downstream devices, and system stability. Use:

- SI for general protection with moderate fault currents.
- VI or EI for zones with high fault current ratios.
- LTI for backup protection or to accommodate inrush currents. Adjust PSM, TMS, and minimum operate time to achieve proper selectivity and ensure reliable operation under all expected fault conditions .

Article Content

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This balance of speed and coordination is achieved through IEC curves, which define the operating times of

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TSM (Time Setting Multiplier) selection should adhere to IEC 60255-3 which defines the standard inverse, very

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(PDF) INVERSE DEFINITE MINIMUM TIME RELAY COORDINATION

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EC456 Power System Protection

Pre-lab assignment For the section of the power distribution system shown in Figure 1 below, find the current pick-up, time dial for

Microsoft PowerPoint

The time overcurrent relay characteristic curve best suited for coordination with fuses is Extremely Inverse, which is similar to the I^2t

Microsoft Word

Matching the Curve Type and Time Dial The inverse time over-current curve characteristics for each type of CO relay was closely

Overcurrent Protection Fundamentals R

The time/current protection characteristics of this protection curve are presented in Figure 10, together with those of the standard

(PDF) Application and settings inverse time relay ...

Setting working time lebih current relay normal inverse curve is obtained by using the formula and the current time [8,

National Institute of Technical Teachers" Training and Research ...

In an inverse definite minimum time, electromagnetic type over-current relay, the minimum time feature is achieved because of

Overcurrent Protection Coordination Methodology — CTI, IDMT Curves

Complete methodology for overcurrent protection coordination covering current transformer interface (CTI) grading

University of Idaho

We would like to show you a description here but the site won't allow us.

Introduction to Protection Relays 1

A fundamental aspect of understanding and effectively utilizing protection relays involves grasping the concept of

Overcurrent Protection & Coordination for Industrial Applications

Solid-State Relays (SS) Curve selection made on the left-side interior of the relay.

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