

Meaning of Relay Protection Setting Values

Article Overview

Relay protection settings define the current and time thresholds at which a relay operates to isolate faults safely and selectively.

Key Relay Settings

1. Plug Setting Multiplier (PSM) PSM, also called the current setting multiplier, represents how many times the actual current exceeds the relay's pickup current. It is calculated as the ratio of the fault current in the relay to its pickup current. PSM determines the speed of relay operation on inverse time characteristics: higher PSM values result in faster tripping, while lower values delay operation. It is commonly adjusted by changing the number of active turns in the relay coil using a plug bridge, expressed as a percentage of the rated CT secondary current . 2. Time Setting Multiplier (TSM) TSM scales the base operating time derived from the relay's characteristic curve. By adjusting TSM, the actual trip time can be increased or decreased to achieve proper coordination between upstream and downstream relays. Lower TSM values produce faster tripping, while higher values provide backup protection. TSM is adjusted by changing the distance between the relay's moving contact and coil in electromechanical relays . 3. Overload Setting (OL) OL defines the thermal overload threshold for the relay. It ensures that the relay trips when the current exceeds a safe operating limit for a prolonged period, protecting equipment from overheating . 4. Earth Leakage / Earth Fault Setting (EL) EL specifies the pickup current for earth fault detection. It is typically set as a percentage of the rated CT secondary current, often ranging from 10% to 70%, depending on system requirements . 5. Multiplying Factor (MF) MF, also called the metering or scaling factor, converts measured currents into per-unit or dimensionless values for relay calculations. It ensures that relay settings correspond accurately to the actual system currents .

Practical Application

Relay settings are selected based on system parameters, fault current levels, and coordination requirements. For example, in overcurrent protection, the pickup current might be set at 120-150% of the line current, with TSM adjusted to maintain selectivity between relays on different feeders. Time-graded protection ensures that the relay closest to the fault operates first, while upstream relays provide backup with slightly longer operating times . Calculation Example: If a relay is connected to a CT with a 200/1 A ratio and the desired pickup is 150% of rated current, the relay pickup current is: $I_{pickup} = PSM \times CT \text{ secondary current} = 1.5 \times 1 \text{ A} = 1.5 \text{ A}$. The operating time is then determined from the relay's time-current characteristic curve and multiplied by TSM to achieve the final trip time . These settings ensure selective, reliable, and fast fault clearance, protecting equipment and maintaining system stability.

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

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

To avoid relay mal-operation, set Slope 2 as high as possible. Normally, a high Slope 2 setting causes slow tripping for evolving

The objective of this presentation is to convey a basic understanding of protective relays to an audience of engineers already familiar

The relay setting development process should include a series of steps that guides the settings engineer to achieve reliable and

Relay protection circuitry This handbook covers the code of practice in protection circuitry

A primary motor protective element of the motor protection relay is the thermal overload element and this is accomplished through

Power System Protection Setting Calculations The electrical grid is a vast and intricate system designed to ensure the

Summary: Several electrical terms are used when describing protective relays and other types of relays. This article

Introduction to Protective Relaying What are Protective Relays, or Protection Relays? Protective relays are used in industrial power

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

Relay coordination is the process of selecting settings that will assure that the relays will operate in a reliable and selective way. In

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

When studying electrical protective relays, we often use specific terms. To understand how different protective relays

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

Protection System Elements Protective relays Circuit breakers CTs and VTs (instrument transformers)

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