

Transformer ratio for relay protection



Article Overview

The transformer ratio for relay protection is selected based on the transformer's primary current, relay requirements, CT accuracy, and system fault levels to ensure reliable and secure operation.

Key Considerations for Selecting Transformer Ratio

1. Determine Primary Current and Relay Requirements The CT ratio should match the transformer's rated primary current and the relay's secondary current input (commonly 5 A or 1 A). This ensures that the relay receives a proportional current for both normal operation and fault conditions, maintaining accuracy and avoiding misoperation ().
2. Consider CT Accuracy and Class CTs are classified by accuracy classes (e.g., ANSI C or IEC P class). For protection, CTs must maintain accuracy under fault conditions, including high currents. The selected ratio should prevent CT saturation during external faults while providing sufficient sensitivity for internal faults ().
3. Relay Tap Settings and Per-Unit Scaling Modern relays often use tap settings (TAP) to scale secondary currents into per-unit values. The TAP ratio ensures that full-load through-current conditions correspond to a per-unit value of 1.0, and the ratio TAP_{max}/TAP_{min} is typically limited (e.g., ≤ 7.5) to maintain relay stability ().
4. Burden and Saturation Considerations The total burden (resistance and reactance of the relay and wiring) affects CT performance. The CT ratio should be chosen so that the secondary current does not exceed the CT's rated burden, preventing saturation and ensuring accurate differential or overcurrent protection ().
5. Coordination with Protection Scheme The CT ratio must be compatible with the protection scheme, whether differential, IDMT, or overcurrent. For differential protection, the CTs on both sides of the transformer must have matched ratios and...

Article Content

Aug 21, 2025

51 Relay Setting vs. CT Ratio

My experience in industrial applications (steel plants, etc.) has been that the CT is close to 200% of transformer FLA

Sep 25, 2025

Determining CT Requirements for Generator and Transformer Protective Relays

Subsequently, we present a methodology for evaluating CT requirements for generator and transformer protective relays. Finally, we

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Transformer Relay Setting Calculation

This document provides calculations for setting various protective relays for a 30MVA power transformer with a voltage ratio of

Sep 07, 2025

CT sizing for generator and transformer protective relays

Then using these models, we determine CT sizing guidelines and relay settings for a generator and transformer

Sep 12, 2025

Power transformer differential protection using current and voltage ratios

Investigation of the proposed differential protection scheme using both current and voltage ratios shows that it can

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Protective Relay Basics

Traditionally, protective relays were electromechanical devices utilizing induction disk, coils, contacts, and solenoid elements to

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CT Sizing for Generator and Transformer Protective Relays

A typical application would be to set the first zone to protect the generator and the second zone to protect the transformer. The two

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Transformer Protection Calculations & Settings

Transformer simulations show that magnetizing inrush current usually yields more than 30% of I_{F2}/I_{F1} in the first cycle of the inrush

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CT SIZING FOR PRIMARY PROTECTION RELAY

Does the relay protect the primary side of the transformer also? With such a low ratio CT you need to check if the CT

May 05, 2026

Power System Protective Relays: Principles & Practices

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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Transformer protection and control

ABB's transformer protection relays are used for protection, control, measurement and supervision of power transformers, unit and

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A comprehensive guide to correct calculation for transformer ...

By the end of this article, readers will gain a comprehensive understanding of the step-by-step process involved in

Jan 12, 2026

Transformer Protection Practices Explained | PDF | Transformer | Relay

This document discusses transformer protection practices for transformers rated 501 kVA and higher. It focuses on percentage

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Current Transformer Sizing Best Practices for Reliable Protection

Quick Definition: Current transformer sizing is the process of selecting a CT ratio, burden, and accuracy class that

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Relay Settings Calculations

The relay (SEL-787) use the transformer MVA rating as a common reference point, TAP scaling converts all sec-ondary currents

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RELAY SETTING CALCULATION

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

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CT Ratio Chart: Standard Ratios from 5/5 to 6000/5 | Selection Guide

Complete CT ratio chart with standard ratios for metering and protection CTs. Includes primary current ranges, accuracy class

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Transformer Protection Application Guide

This guide focuses primarily on application of protective relays for the protection of power transformers, with an emphasis on the

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Special considerations when selecting transformer protection

Current Transformers Current transformer ratio selection and performance require special attention when applying

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Understanding X/R Ratio in Transformers – A Practical Example

The X/R ratio (reactance-to-resistance ratio) of a transformer is a critical parameter in short-circuit studies and

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CT Ratio Calculation Guide | Formula + Selection Chart

Step-by-step guide to calculating and selecting the right current transformer ratio for metering and

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IEEE Guide for Protective Relay Applications to Power Transformers

Types of transformer failures This guide deals primarily with the application of electrical relays and over-current protective devices to

Mar 19, 2026

Three good examples of the application of modern relays to transformer ...

Transformer protection relaying This technical article provides three examples of the application of modern relays to

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Transformer Protection Configuration Principles

Transformer protection relay is critical for maintaining power system reliability. A well-designed transformer protection

Mar 16, 2026

Compensating CT Ratio Mismatch | Differential Protection

Discussion on the fundamental principles of compensating CT ratio mismatch on transformer differential protection

Oct 17, 2025

Eight typical transformer protection schemes with correctly selected relays

Protection schemes and relays selection This technical article shows application hints for typical transformer

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