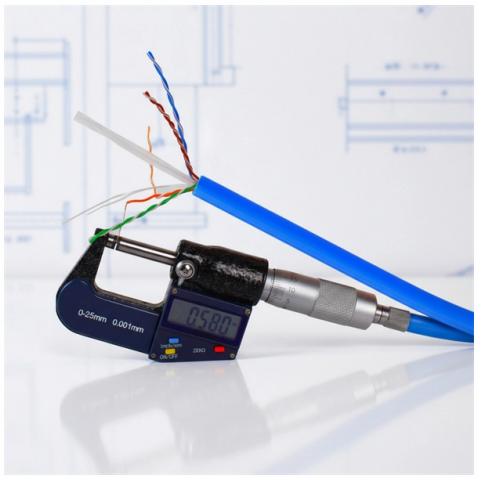
Relay protection device current transformer



Overview

Transformer Protection: Complete Guide to Protection Complete guide to transformer protection covering Buchholz relay, differential protection, overcurrent.

Key Takeaways

Current Transformers (CTs) are essential for relay protection, converting high primary currents to standardized secondary currents for accurate and safe operation of protective relays.

Role of C

Ts in Relay ProtectionCurrent transformers serve as the primary sensing interface between high-current power circuits and low-voltage protection equipment. They provide galvanic isolation and scale down large currents to standardized secondary values (commonly 1 A or 5 A), enabling protective relays—such as overcurrent, differential, directional, and distance relays—to operate safely and accurately.

C

Ts ensure that relays receive a faithful representation of the primary current waveform, including magnitude and phase, which is critical for correct fault detection and system protection.

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Selection and Sizing

When selecting CTs for protection: Primary rating should match the rated current of the transformer or line being protected. Accuracy class must be suitable for the protection scheme; differential protection requires high accuracy to detect small differences between incoming and outgoing currents. Dynamic range should accommodate both normal load currents and high-magnitude fault currents without severe saturation.

Polarity and phase considerations are crucial; incorrect polarity is a common cause of false differential trips. Transformer vector groups and phase shifts must be accounted for in CT connections or relay settings. Application in Transformer ProtectionCTs are used in various transformer protection schemes: Differential protection: CTs on primary and secondary sides form a circulating current system to detect internal faults.

Phase and ratio corrections are applied either via interposing CTs or digitally in modern numerical relays. Overcurrent and earth-fault protection: CTs feed relays that detect excessive currents or ground faults, providing fast tripping to prevent transformer damage. Relay coordination: Time delay characteristics and CT ratios are selected to discriminate between transformer faults and downstream protection devices.

Installation and Testing

Proper installation ensures reliable operation: Use identical CTs for each phase in differential schemes or apply ratio correction in relay settings. Verify polarity markings and wiring to prevent false trips.

Test C

Ts for ratio accuracy, phase displacement, and saturation characteristics before commissioning.

Practical Considerations

Digital relays can implement ratio and phase correction in software, reducing the need for additional hardware CTs.

C

Ts must handle both load and fault currents without distortion to ensure dependable relay operation. Selection balances cost, space, and protection reliability, considering the consequences of transformer failure, including safety risks and economic impact. In summary, relay protection CTs are critical for accurate fault detection and transformer protection, requiring careful selection, installation, and coordination with protective relays to ensure system safety and reliability.

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Article Content

Transformer Protection: Complete Guide to Protection

Complete guide to transformer protection covering Buchholz relay, differential protection, overcurrent, overheating, and over-fluxing protection. Learn about

Protective Relay: Working, Types, and Applications

Learn about protective relays, their working principle, types, and applications in power systems. Discover how relays protect transformers, generators, and transmission lines from faults.

Protective Relays: Types, Working Principle & Uses

Learn how protective relays detect faults, trip breakers, coordinate protection zones, and protect feeders, transformers, motors, generators, and lines.

Transformer Protection Application Guide

This guide focuses primarily on application of protective relays for the protection of power transformers, with an emphasis on the most prevalent protection schemes and transformers.

CTs in Power System Protection

Practical guide on how current transformers support protection relays, differential, overcurrent, directional and busbar schemes in substations.

Transformer protection and control

Transformer protection relays are used for protection, control, measurement and supervision of power transformers.

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Transformer Differential Protection（ANSI 87T）: Working Principle ...

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The protection system consists of Current Transformers installed on all sides of the transformer (e.g., High Voltage HV and Low Voltage LV sides) and the Transformer Differential

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