

Improvements in Transformer Protection and Control

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Abstract

This paper describes new advancements for improved power transformer protection and control. These advancements include -

- an adaptive differential element which increases its security after detection of an external fault;
- the security and dependability benefits of harmonic restraint combined with the speed of harmonic blocking for optimum performance;
- a new negative-sequence differential element that improves sensitivity for internal turn-to-turn faults under heavy load conditions;
- new logic which adds security to the differential elements during external faults with CT saturation and detects CT trouble to prevent differential element misoperations;
- adaptive overcurrent elements that improve overcurrent coordination for different operating conditions;
- a PC-based commissioning-assistant tool that automatically detects wiring and settings errors;
- a control system that uses synchronized measurements to minimize loop current flow and losses in parallel transformer applications.

Discussion Points

1. Fast and secure differential elements with minimum CT requirements avoid unnecessary transformer disconnections from the power system.
2. Dependable and sensitive differential elements provide proper transformer protection for faults during energization and turn-to-turn faults.
3. Fast CT trouble detection prevents differential element operation during normal load conditions and external faults.
4. Synchronized measurements provide information for proper load-tap changer control to minimize transformer losses in parallel transformer applications.