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Advancements in Transformer Monitoring and Protection: A Comprehensive Review

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Abstract: *Among modern power systems, the transformers are an essential part of ensuring stability and efficiency for energy distribution. Rising complexity in power grids, combined with renewable sources of energy, introduces new challenges such as harmonic distortion, temperature fluctuations, and real-time monitoring. This paper reviews recent developments in transformer monitoring and protection technologies, which include IoT-based systems, numerical relays, and digital differential protection. It identifies gaps in scalability, cybersecurity, and merger of monitoring and protection systems from key studies, and a single framework is proposed to overcome the challenges and pave their way to more reliable and adaptive transformer systems.*

Keywords: modern power systems

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