EPRI

2024

AT A GLANCE

Using Voltage and Current Measurements for Monitoring Asset Conditions

Program 37.117

Research Value

- Improved risk assessment of substation assets using minimal quantities and types of data
- Reduced operations and maintenance (O&M) cost for monitoring major substation equipment health
- Increased reliability of power supply through early warning of asset failures
- Enhanced safety by reducing unexpected catastrophic equipment failure

Member Benefits

- Exploration of cost-effective transformer monitoring capabilities and limitations
- Quantification of financial impacts of various transformer health monitoring techniques
- Evaluation of options to reduce transformer O&M costs compared to industry standard practices
- Expansion of research to identify future asset health monitoring opportunities among non-transformer equipment for additional O&M optimization

A unique opportunity exists to leverage the large volumes of existing measurements of voltage and current in a substation for monitoring asset condition. The key research questions are: which assets in the substation would be ideal candidates for this solution, and how to determine the condition of those assets from voltage and current measurements?

The project objective is to effectively utilize the existing data streams of voltage and current for diagnosis of equipment. The significant advantage is that the voltage and current signals are already being measured for other functions, such as protection and metering. If these same signals could also be utilized to provide insights into asset condition, it may present an opportunity to reduce the O&M costs of condition monitoring of a wide range of substation equipment. If successful, the monitoring results could provide insights into the condition of a wide range of substation apparatus including instrument transformers, arresters, breakers, transformers, and disconnect switches.

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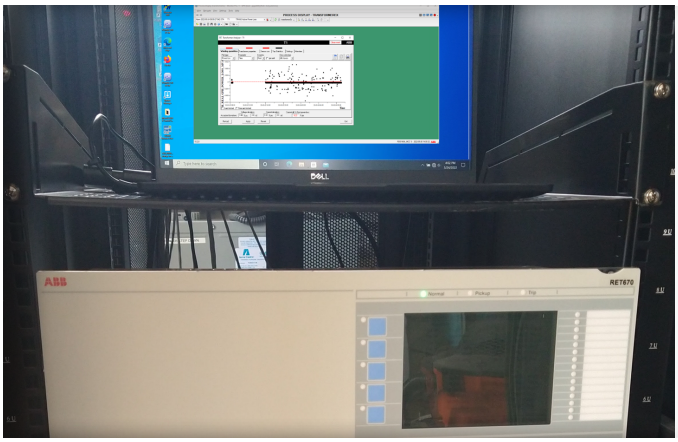
Research Highlights



Detailed Testing Results of Transformer Monitoring Durability Under Transient Conditions

Transformer monitoring software gauges transformer health based on data previously available only in offline tests. Software input is comprised of current and voltage signals from a digital protective relay. The research is understanding the data and comparison to asset health.

Cost Analysis of Newly Proposed Online Transformer Monitoring Techniques vs Traditional Offline Methods

The P37.117 project gathers data using instrument transformers for current and voltage signals to asses the heath online versus having to take the asset offline.

Evaluation of Non-Transformer Substation Assets as Candidates for Future Current and Voltage Monitoring

This project's research primarily takes place at EPRI's 138kV research substation. The project identifies different assets that could be used to identify health of the asset online using voltage and current.

For more information, contact:

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