

Distribution Recloser Life-Cycle Management



Failed distribution recloser example.

Background, Objectives, and New Learnings

Grid modernization initiatives are underway at utilities to prepare the distribution system to meet future needs of customers and integrate distributed energy resources while maintaining a highly reliable and resilient system. Distribution automation is a key component of these modernization efforts that allows utilities to monitor, operate, and optimize their systems.

The use of reclosers is critical to automating the distribution system. Reclosers are for fault isolation to avoid extended outages due to momentary interruptions and provide added system awareness when integrated with distribution management systems. Reclosers operate infrequently but must do so reliably and consistently. Manufacturers perform design and production tests according to industry standards, but these tests typically do not include analysis of the long-term performance of the design and materials used to construct the device.

EPRI plans to subject reclosers to accelerated aging tests and assess each device to identify degradation mechanisms. EPRI plans to also test the recloser's embedded and external sensors for accuracy before and after accelerated aging.

- Identify recloser degradation modes
- Inform recloser fleet specifications and deployment decisions
- Determine inspection and maintenance practices to extend recloser service life
- Evaluate accuracy of embedded and external sensors
- Implement recloser aging protocol based on previous recloser degradation studies

Benefits

Utilities may benefit from this research through enhanced knowledge of recloser aging, resulting in more informed decisions related to the acquisition, operation, maintenance, and disposal of distribution reclosers. Utilities can apply the results to promote a more reliable, safe, and cost-effective recloser fleet. An additional benefit from testing may be an enhanced recloser aging test protocol. This could enable more effective testing of distribution line reclosers and future applications to other equipment.

The public benefits of this work could include a more reliable and cost-effective distribution system that includes improved performance of reclosers and other switching devices.

Project Approach and Summary

In researching failure and degradation modes of reclosers, the project will consist of three main tasks.

The first task will test the accuracy of the recloser's embedded and external voltage and current sensors. The recloser will be energized through a range of voltages and load currents, and the measurements from the recloser control will be compared to calibrated instrumentation.

The second task will subject the recloser to an accelerated aging test for a period of 2,000 hours. The recloser will be operated prior to aging and will also be energized during the aging process. The environmental stressors include rain, salt fog, humidity, thermal cycling, and UV. Post-aging sensor accuracy testing will indicate if the sensors are susceptible to long-term aging effects.

The third task includes thorough inspections of the recloser at the completion of all testing. Material samples may be taken for lab analysis. Electrical testing may be performed to ascertain the condition of the recloser. Each recloser tested will also be systematically dismantled and inspected to identify degradation.

Deliverables

Each utility participating in this project will receive a report documenting the results of the sensor accuracy tests, the aging test, and teardown inspections upon completion of testing for each recloser.

The non-proprietary results of this work will be incorporated into EPRI Distribution Systems R&D program, and made available to the public, for purchase or otherwise.

Price of Project

The cost is \$60,000 per participant. This project qualifies for Self-Directed Funding (SDF) or Tailored Collaboration (TC) funds. The project can be funded over three years.

Project Status and Schedule

This project is expected to begin in the third quarter of 2018 and to run for 36 months. Each project participant can provide one (1) recloser for laboratory testing. Testing will commence once reclosers are received and scheduled. The project plans to test up to 12 reclosers over the three-year project schedule.

Who Should Join

Utilities that are developing recloser procurement specifications or are in the process of new recloser deployments could benefit from joining the project. Also, utilities who are developing inspection and maintenance practices for existing recloser fleets or who want to better understand recloser life cycle may also benefit from the project.

Utilities that have an interest in a specific recloser model can provide that model for testing during the project. All participants in the collaborative project will receive the results from each tested recloser.

Contact Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

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