



"Safety is our top priority. Eaton's Arcon system is a solution that enables more security than the usual standard."

Wolfgang Kochs, RWE Power

Protecting people and property with Eaton's Arcon system

Location:

Essen, Germany

Segment:

Utility & Smart Grid

Problem:

Arc flash incidents pose a potential hazard to switchgear and people, and as such to the security in power supply.

Solution:

Arcon arc fault protection system

Results:

Higher security with active arc fault protection

Background

One of the principal tasks of an electricity supplier is to ensure a reliable supply of power to its customers. Trust and performance are key factors for commercial success. Many European electricity suppliers have aspired to help improve the energy system by investing in renewable energy, modern network infrastructure and the security of existing facilities.

One company spearheading the charge is RWE, a leading supplier of gas and electricity in Europe, which is striving to maintain the quality of supply at an internationally exemplary level with low outage times. The company invests millions in upkeep, operation and maintenance. As part of its efforts to provide superior quality, RWE develops systems and concepts that provide the greatest possible security. With demands on the quality and

operation of the networks rising as a result of expanded use of renewable energy and increased deployment of localized generation facilities, this need for security is more important than ever.

Challenges

The potential adverse effects of arc flash incidents on the security of electricity supply should not be underestimated. Incidents can occur as a consequence of insulation faults between power lines or between power lines and the ground. Despite implementing everyday security measures, arc flashes can still occur in electrical distribution facilities e.g. due to human error while working on the switchgear, contamination or condensation, and voltage surges.

The impact of arc flash incidents can be devastating and, under certain conditions, the destruction can be comparable to that of an explosion. If such an extreme incident occurs, it can lead to an outage lasting days or weeks, as well as high recovery costs. Along with damage to the switchgear, which can be beyond repair and might require replacement, there is a high risk of injury to people who are in the vicinity or working at the facility.

Solution

RWE looked to Eaton technology for its low-voltage substations, including the Arcon arc fault protection system and Modan power distribution system in order to minimize the risk of arc flash accidents.

For many years Eaton has been investing considerable time and money in research to discover ways to reduce the risk of arcing. Thanks to these efforts, the company is now regarded as a worldwide leader in this area and offers specific solutions for avoiding and controlling this problem.

Eaton's Arcon system is one of these solutions. When an arc flash occurs, the system detects a problem based on the emitted light and the short-circuit current. This current is detected by a flexible fiber optic cable in the Arcon system that is run along the switchgear components so that it passes all the locations where arcs can occur. The cable captures light over its entire length and when the sensor detects the characteristic flash of an arc, it sends a signal to the logic module, which also monitors the current.



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If both the sensor and logic module simultaneously detect a current exceeding defined thresholds, an extinguishing device is triggered. This device initiates a three-phase short circuit as close as possible to the feed point, in parallel with the fault location. The current takes the path of least resistance and the arc fault is extinguished. Thus, the energy that would otherwise have fed the arc is diverted to the short circuit, stopping the arc before it has a chance to develop.

The entire process – consisting of detection, evaluation and extinguishing – is completed in less than two milliseconds. After the extinguishing process, the circuit breaker in the feeder line separates the busbar section prone to arcing from the grid, leaving all unaffected sections still in operation. This method has proven to be reliable and effective. In addition to virtually eliminating the risk of personal injury due to arcing, Eaton's Arcon system minimizes damage to the switchgear so that it can be put back into service quickly and at minimal expense.

The arc fault protection system developed by Eaton has passed all VdS tests and inspections with flying colors. Herbert Schmolke of VdS Schadensverhütung in Cologne, one of Germany's leading independent testing institutions for fire protection and security, confirmed: "The basic idea of Eaton's arc fault protection system is prevention instead of mitigation. Based on the proven effectiveness of the Arcon system, the German Insurance Association and VdS have defined truly effective arc fault protection in the guidelines for fire insurance to mean that no destructive energy can be released in the event of an arc."

Results

In combination with Eaton's type-tested Modan low-voltage power distribution system, which features high operational reliability and operator safety as standard, the Arcon system offers electricity suppliers such as RWE and the industrial and building services sectors worldwide a means to manage and distribute power safely, at currents of up to 6,300 A. The modular Modan concept also enables fast and secure communication with automation and control systems over standard field buses. In addition, Eaton's communication-capable switchgear and protective devices make it possible to capture operating and diagnostic data directly on-site. This data enables users to respond to events quickly and economically.

The withdrawable and removable unit design of the Modan modules allows live swapping, virtually eliminating interruptions in power supply in the event of module replacement or distribution equipment expansion.

"Safety is our top priority," says Wolfgang Kochs from RWE Power. "One of our main tasks is to ensure a continuous supply of power to all of our customers. The Arcon system from Eaton is a solution that enables more security than the usual standard. This capability is important to us, and we gladly make use of it."



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