



Fiber Optic Current Sensing (CAMOS)

The Challenge

Operating high-voltage (HV) cable systems is a growing challenge for grid operators as power networks become more complex and heavily loaded. Unlike overhead lines, HV cables have limited heat dissipation and are more difficult to inspect and maintain, requiring sophisticated monitoring of temperature, load, and insulation health. As assets age, operators need advanced diagnostics, digital monitoring, and predictive maintenance strategies to maximize cable utilization while ensuring safe, reliable, and cost-effective grid operation.

Healthy insulation is essential for the reliable operation of HV cable systems. Good insulation withstands thermal, electrical, and environmental stresses, extending asset lifetime and reducing failure risk. Predictive maintenance of cable insulation improves network reliability, avoids costly outages and repairs, but requires a sophisticated health condition monitoring system.

Sheath current measurements are widely used because the metallic sheath provides an indirect indication of the insulation system's health. Changes in insulation condition often influence the current flowing in the sheath, making sheath current a useful diagnostic parameter.

The Innovation

AP Sensing's fiber optic sheath current measurement system (CAMOS*) is a non-intrusive diagnostic method used to assess the condition of HV cable insulation. By continuously monitoring currents flowing in the metallic cable sheath, operators can detect abnormalities caused by insulation degradation, moisture ingress, sheath bonding defects and emerging fault signatures. Changes in sheath current magnitude, phase angle, or harmonic content can indicate developing insulation and bonding problems before failure occurs. Trending these measurements over time enables predictive maintenance, improves asset reliability, reduces outage risks, and supports optimized cable system operation and lifetime management. Thanks to the purely optical measurement, AP Sensing's CAMOS system is accurate and sensitive even in electrically noisy environments.



The Solution

CAMOS delivers reliable remote sheath current acquisition through existing single-mode optical fiber networks, removing the need for local power supplies and simplifying system deployment and operation.

The CAMOS OCT solution is passive, requiring no external power. It measures cable current by detecting magnetic field-induced changes in light polarization, which are analyzed by a dedicated interrogator. The sensors can work even in adverse conditions: flooded or saline areas, high and low temperatures. Factory-tested and calibrated, they also include a third winding for short-circuit current measurement above 60 kA. Using standard single-mode fiber, the system is easy to install by any qualified fiber-optic contractor.

The CAMOS FbCM solution seamlessly integrates with existing or planned AP Sensing Distributed Acoustic Sensing (DAS) installations. By leveraging the existing DAS interrogator and fiber network, the solution eliminates the need for additional hardware, reducing complexity and installation costs. By bringing together acoustic monitoring and current sensing on a single platform, the CAMOS FbCM solution gives utilities a smarter and more economical way to monitor critical

assets. The integrated solution enhances situational awareness, enables proactive asset management, and maximizes the performance and value of existing DAS investments.

The Benefit

- Accurate current measurement from normal operating conditions up to short-circuit currents of 80 kA
- High-precision phase angle measurement for advanced diagnostics and protection
- Inherently saturation-free operation, ensuring linear measurements across the full current range
- Passive sensors requiring no local power supply
- Immunity to electromagnetic interference (EMI)
- Multiplexing of multiple sensors on a single optical fiber
- Sensor suitable for 87L, 87S, and 50S protection functions
- Seamlessly integrated with AP Sensing's DFOS solution

* POWERED BY **SterlumiQ**



Why AP Sensing?

- Industry-leading monitoring solution comprising thermal, acoustic and electrical measurements that offers a holistic insight into cable conditions.
- Industrial quality supported by a complete set type tests and certifications in compliance with internationally recognized standards.
- Project management, commissioning, and post-sales service; world-class support for project planning, design and installation.
- Network of regional partners and experts, and proven deployment in all regions of the world.
- AP Sensing's commitment to the power industry for almost 20 years has resulted in many successful projects and proven deployment in all regions of the world.



Passion for Plants.
For every unit sold, AP Sensing plants 100 trees.



Watch our Application Video
<https://youtu.be/j52-Zq6ByPO>



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