



## Underground Power Cable Monitoring



### THE CHALLENGE

Power demand is continuously growing, together with the need for increasing reliability of power networks. Underground transmission is gaining popularity for many reasons: underground cables take up less space, have less impact on property values and aesthetics, are not subject to severe weather conditions, and do not provide an electrocution hazard for humans and wildlife.

However, these benefits come with a higher life cycle cost. Insulated cables and excavation are expensive. In addition, underground lines cannot dissipate heat as well as overhead lines. Consequently, underground lines require proper life cycle management and are less accessible for future changes and upgrades.

Failures in underground transmission lines are less frequent than overhead lines, occurring mainly due to defective joints or external damage. But failures are extremely costly and time-intensive to repair. Underground line outages can last a month or more due to the difficulty of determining the exact location in need of repair.

AP Sensing's monitoring solution is designed to manage these shortcomings of underground power cables.

### THE INNOVATION

AP Sensing's solution offers a ground-breaking combination of Distributed Temperature Sensing (DTS) and Distributed Acoustic Sensing (DAS) technologies, utilizing fiber optic cables already integrated in or externally attached to the power cable. We measure a continuous temperature profile along the power cable to monitor thermally critical sections like crossings and joints. Conductor temperatures, cable ampacities and emergency ratings are computed in real time (Real Time Thermal Rating – RTTR), enabling operational flexibility and the ability to uprate the cable. Permanent acoustic measurements help to reduce downtime by locating cable faults as well as preventing cable damages through the detection of potential hazards such as construction work.



*Power substation*



## WORLD-CLASS SYSTEMS

AP Sensing's monitoring solution includes an ultra-modern, high performance RAMAN DTS system utilizing our patented code-correlation technique. Our system captures temperature events very accurately, while unaffected by cable strain that typically causes misinterpretations for other DTS technologies. Consequently, our DTS instrument is a perfect tool for RTRR and DoB computations.

Acoustic measurements are collected with our world-class, phase-based DAS system. Our unique 2P Squared technology features stable signal linearity and high sensitivity over long distances. Smart alarm algorithms detect and automatically classify intrusion events such as digging, drilling, or hammering. Cable faults are located immediately, with much more precision than conventional methods. The powerful, integrational SmartVision™ management software completes our AP Sensing monitoring solution with an informative GUI, analyzing tools and network capabilities.



## RELIABLE & EFFICIENT

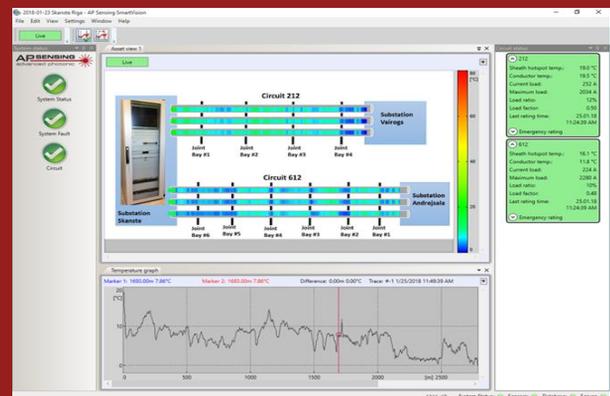
AP Sensing's complete monitoring solution for underground cables provides an effective way to mitigate operational and financial risk. Identification and elimination of thermal bottlenecks increase cable lifetime and safety. Dynamic Cable Ratings optimize utilization of the circuit, while still observing cable limits. Optimized ratings defer investments in costly upgrades and enable flexible management of the transmission line.

In addition, intentional or accidental third party intrusion events are recorded, helping operators to develop awareness of hazards and identify the party responsible for the damage. Immediate and accurate cable fault location significantly improves repair times, therefore diminishing unscheduled cable downtimes.



## WHY AP SENSING?

- Industry-leading monitoring solution comprising DTS, DAS, RTRR and DoB that offers excellent performance
- Best measurement results due to unique technologies such as code correlation and 2P Squared
- No drift and no recalibration thanks to patented single-receiver design and inherent strain insensitivity (no strain cross-talk)
- Industrial quality supported by a complete set of 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
- Our experience, network of regional partners and experts, and proven deployment in all regions in the world



*SmartVision™ asset visualization*



Passion for Plants.

For every unit sold, AP Sensing plants 100 trees