

NITRO Fiber Sensing for Power

**Harness the power of fiber sensing technology to manage, optimize
and maintain your power distribution networks**



NITRO Fiber Sensing is a solution that enables power utility owners and transmission system operators (TSO) to stay on top of all aspects of their operations. From infrastructure health to fault prediction and location, from capacity management to threat detection and perimeter security.

Electrical power network owners and operators face a myriad of challenges, from maintaining the reliability and efficiency of aging infrastructure to meeting power demands while ensuring regulatory compliance. Ensuring uninterrupted power transmission amidst these complexities requires innovative solutions that can provide comprehensive coverage, live data and insight.

NITRO Fiber Sensing applications for power distribution provide cutting-edge solutions designed to transform power grid operations. By harnessing the power of optical fibers and distributed fiber sensing technologies, this state-of-the-art solution offers comprehensive monitoring capabilities with real-time data and trend analysis. Enabling real-time detection and localization of cable hot spots and strain points, while supporting Ampacity forecasting and Real-Time-Thermal-Rating (RTTR). From optimizing asset management to ensuring supply quota is met, it empowers power network owners/operators with unprecedented visibility, ensuring your operations are efficient, reliable and secure.

Benefits

- Boost network reliability
- Optimize power transmission
- Prolong lifetime of cables
- Minimize failures
- Reduce outage durations
- Enable informed decision-making
- Drive cost and operational efficiency

Features

- Superior data/trend analysis
- Real-time data, alerts and alarms
- Perimeter/security monitoring
- Threat detection, identification and localization
- Distributed Temperature Sensing (DTS)
- Distributed Temperature and Strain Sensing (DTSS)
- Distributed Acoustic Sensing (DAS)

Applications

- Power distribution grids/networks
- Overhead power cables
- Optical Ground Wire (OPGW)
- Buried/subsea cables
- Wind farms and landing cables





NITRO Fiber Sensing provides a suite of compelling capabilities for utility owners and TSO, from continuous monitoring of critical infrastructure to threat detection/perimeter breaches in real time. Enhancing not only operational efficiency but also infrastructure security. Whether it's a potential fault or unauthorized access, operators receive immediate alerts for rapid response to minimize damage and prevent disruptions.

Infrastructure Health and Network Uptime

By monitoring the condition of power lines and other components, operators can predict and even prevent failures before they occur, boosting asset integrity, network reliability and uptime. Distributed fiber optic sensing augments existing network monitoring by providing enhanced visibility into the condition of power distribution infrastructure. Supporting 24/7 oversight of any anomalies or failures.

Immediate Diagnostics

Real-time information and alerts about the condition of assets enables a more immediate diagnosis of potential issues. Operators can receive instant data on the status of cables, such as temperature, strain, or vibration disturbances, which is vital for prompt decision-making. Establishing a quick response to emerging issues, such as detecting cable arcing and flashover events at the earliest possible stage, leads to a reduction in network downtime and shorter outage durations.

Targeted and Rapid Response

Fault and event localization is key to facilitating a more targeted and rapid response, issues must not only be identified quickly but also have their exact location pinpointed. Distributed fiber optic sensing not only identifies issues but locates them too, informing decisions about what resources are required and from where, streamlining and improving the efficiency of maintenance and repair operations.

Thermal Damage Protection

Excessive heat generated can pose a real threat to cable stability and longevity (health). Too much heat in overhead cables can cause them to expand and sag, putting them under additional strain and at risk of permanent damage. Too much heat in buried cables can again result in conductor damage, melting and arcing explosions. By utilizing distributed temperature sensing data operations teams can implement the Real-Time-Thermal-Rating (RTTR) of cables to meet power supply demands and manage peak surges without damaging cables.

Avoid Icing Damage

By continuously monitoring temperature and strain along cables can detect the formation of ice in real-time. Early detection allows for prompt de-icing measures, preventing the accumulation of heavy ice that can cause cable sagging or breakage. Additionally, pinpointing the exact locations where icing is occurring, enables targeted interventions and reduces the need for widespread inspections. Enhancing the reliability and safety of power networks, minimizing the risk of outages and costly repairs due to icing damage.





Power Distribution Optimization

Over utilizing cables can cause damage but equally underutilizing the power transfer capability of a cable means operators are not getting the most out of infrastructure investment. There is a balance to be struck between maximizing power transfer and cable health/lifespan. Distributed temperature sensing data can be used for Ampacity forecasting or Dynamic Line Rating (DLR) to optimize power transfer capacity while avoiding damage to cables. Eliminating inefficiencies in a network power distribution while enhancing asset longevity, providing early warning to re-route or load balance power transfer through a different part of the network.

Protect Offshore Landing Cables

Subsea power cables are exposed to several potential threats such as anchor drags, fishing activities, or geological disturbances. Continuous monitoring of cable strain and of acoustic signals in the environment around cables allows for timely intervention to reduce the risk of damage and costly repairs. Helping to maintain the reliability and longevity of critical power infrastructure, ultimately supporting the stability of energy supply.

Actionable Insights for Asset Management and Maintenance

Stay ahead of asset degradation with data that informs remedial engineering and design improvements. Information collected through fiber optic sensing can be analyzed to give insight into trends and operational performance of a power network which can be used to make informed decisions about maintenance, infrastructure upgrades, capacity planning, or other strategic initiatives. Enabling a proactive maintenance approach which helps to enhance the overall reliability and lifespan of power network components while maintaining supply uptime. The long-term savings from fewer unplanned outages can be significant.



Intrusion Detection and Enhanced Security Measures

By detecting unusual activities in vibrations and acoustic signals in the environment along and around cables, acoustic fiber sensing can enhance threat detection. Enabling quick identification, localization and notification of unauthorized activities such as unplanned construction works (e.g. manual or mechanical digging) and tampering, fence climbing or other security breaches such as people or vehicles approaching or breaching a cables perimeter. Allowing you to respond to external threats swiftly, it provides the critical intelligence required to react promptly and protect your assets, helping to prevent accidental damage, potential sabotage or theft before it occurs.

Infrastructure Stability Assessment

Monitoring for structural movement or fatigue is crucial where power infrastructure is in exposed areas or areas prone to extreme weather conditions. Assessing and tracking infrastructure stability is key to prioritizing maintenance and avoiding unplanned outages. Monitoring for environmental conditions such as soil displacement and other factors is particularly useful in areas prone to geo-technical events or at higher risk from natural disasters.

Geographical Coverage

Fiber sensing can monitor extensive lengths of power lines providing wide-area surveillance without the need for multiple traditional sensors. This coverage is especially beneficial in remote or inaccessible areas where physical surveillance is challenging.

Overall, the deployment of NITRO Fiber Sensing can significantly enhance operational efficiency, safety, and reliability, providing a strong return on investment for network owners and operators.

Visit viavisolutions.com/fibersensing to learn more about distributed fiber optic sensing.



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