

Thermal Monitoring for Generators and Motors

Advanced Fiber Optic Temperature Sensing and Monitoring Solutions

In today's demanding industrial environment, large motors and generators are critical assets. Their unexpected failure can lead to catastrophic financial loss, prolonged downtime, and significant safety hazards. OSENSA Innovations provides state-of-the-art fiber optic temperature sensing solutions designed for continuous, real-time thermal protection of this essential equipment.

The Critical Need for Continuous Thermal Monitoring

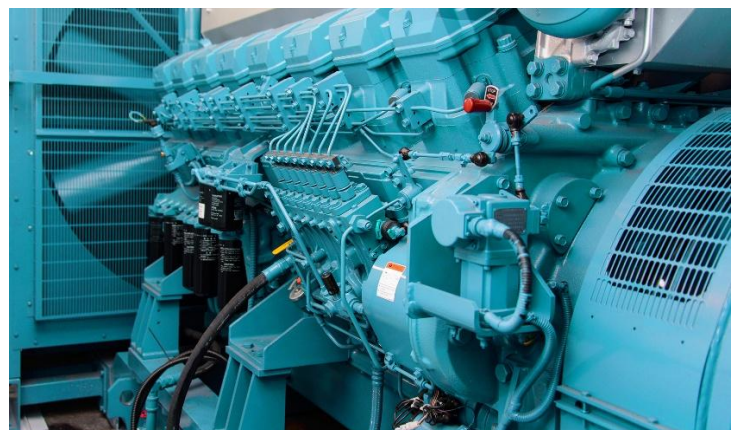
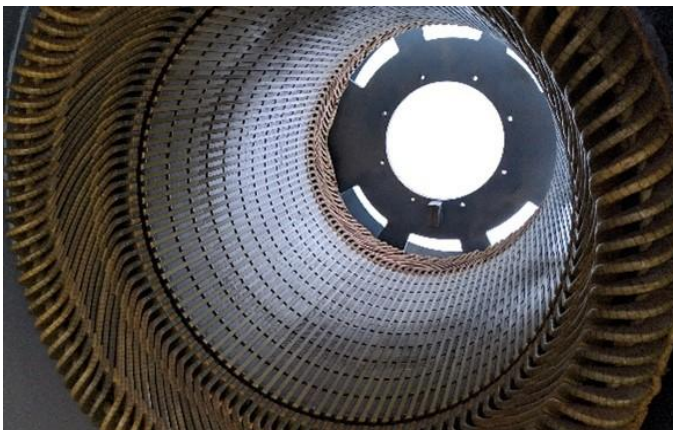
Thermal runaway is a primary cause of failure in rotating machinery. It often originates at physical joints between electrical conductors, such as stator windings, bus bars, and circuit rings. Over time, vibrations can loosen connections, increase electrical resistance and create dangerous hot spots. This degrades insulation, leading to partial discharge and, ultimately, catastrophic failure.

While periodic inspections like thermal imaging have their place, they are snapshots in time and can easily miss evolving faults. Continuous thermal monitoring is the only reliable method to detect these issues early, allowing for proactive intervention before a failure occurs.

Why OSENSA Fiber Optics? Superior Technology for a Demanding Environment

Traditional sensors, like Resistance Temperature Detectors (RTDs), have been used for winding monitoring but are susceptible to inaccuracies and noise in the presence of high voltage and strong electromagnetic fields (EMI/RFI) common in motors and generators.

OSENSA's fiber optic temperature sensors are inherently immune to EMI/RFI, ensuring accurate and reliable data in the most electrically noisy environments. These rugged, passive probes are designed for the long haul, often lasting the entire service life of the equipment without needing replacement.



Key Benefits of OSENSA's Thermal Monitoring Solutions:

- **Real-Time Fault Detection:** Identify developing hot spots in windings, connection points, and bearings instantly.
- **Enhanced Asset Lifespan:** Prevent thermal degradation, extending the operational life of your motors and generators.
- **Reduced Downtime and Maintenance Costs:** Enable planned, predictive maintenance instead of reactive, costly emergency repairs.
- **Inherent Safety:** Passive, dielectric sensors pose no electrical risk and are safe for use in high-voltage environments.
- **Comprehensive Data Logging:** Track thermal performance over time for advanced analytics and condition-based maintenance strategies.

Meeting the Standard: How OSENSA Solutions Support NFPA 70B Compliance

The updated NFPA 70B: Standard for Electrical Equipment Maintenance has shifted the industry from a reactive "run-to-failure" model to a proactive, condition-based maintenance philosophy. It emphasizes that electrical equipment must be maintained in a way that prevents failures, and it specifically endorses continuous monitoring as a best practice.

OSENSA's fiber optic temperature monitoring systems are a direct enabler for compliance with key tenets of NFPA 70B:

1. **Implementing Condition-Based Maintenance (CBM):** NFPA 70B strongly advocates for CBM, which uses real-time data to assess equipment health. OSENSA's solutions provide a continuous stream of accurate temperature data, a primary condition indicator, allowing maintenance to be performed precisely when needed, not just on a fixed schedule.
2. **Preventing Failures Through Predictive Insights:** The standard's core goal is to prevent electrical failures. By continuously monitoring the most thermally critical components, OSENSA's system provides early warning of abnormal heating caused by loose connections, insulation breakdown, or unbalanced loads, allowing correction long before a catastrophic fault occurs.
3. **Documenting Maintenance Effectiveness:** NFPA 70B requires documentation of maintenance activities and their results. OSENSA's systems include robust data logging and reporting capabilities, creating an auditable trail that demonstrates proactive thermal management and a commitment to the standard's preventive maintenance requirements.

4. **Enhancing Safety for Personnel and Facilities:** Electrical failures pose serious arc-flash and fire risks. By identifying thermal anomalies early, our systems help prevent the conditions that lead to these dangerous events, supporting the life-safety objectives central to NFPA 70B.

Integrating OSENSA’s monitoring system is a clear and effective step toward a compliant, predictive maintenance program, directly aligning with the preventive and reliability-focused spirit of NFPA 70B.

OSENSA’s Modern Monitoring System Architecture

OSENSA provides a flexible and scalable system to meet the needs of any application, from a single critical motor to a full fleet of utility generators.

A typical system includes:

- **Fiber Optic Temperature Probes:** Rugged, EMI-immune sensors designed for direct embedding within stator windings, mounting on circuit rings, and placement on critical bearings and connection points.

PRB-PF1

OSENSA’s PRB-PF1 medium voltage fiber optic temperature sensors install on switchgear contacts, bus bars, cast resin transformers, motors, and generator windings to provide reliable 24/7 thermal monitoring with noise-free performance. The probes are constructed from durable, high dielectric strength materials and have been tested to safely operate on equipment rated up to 38 kV (3 phase). They install quickly and can be ordered with optional probe-tip attachments suitable for various applications.



PRB-GB3

OSENSA’s PRB-GB3 medium voltage fiber optic temperature sensors install on switchgear contacts, bus bars, cast resin transformers, motors, and generator windings to provide reliable 24/7 thermal monitoring with noise-free performance. The probes are constructed from durable, high dielectric strength materials and have been tested to safely operate on equipment rated up to 38 kV (3 phase). They install quickly and can be ordered with optional probe-tip attachments suitable for various applications.



PRB-GB4

General purpose, all polymer optical fiber temperature sensor that can withstand repeated use and cleaning.



- **Temperature Transmitters/Signal Conditioners:** 35mm DIN rail mountable units that convert optical signals into standard industrial outputs (e.g., 4-20mA, Modbus RTU) for easy integration into any Plant Distributed Control System (DCS), PLC, or SCADA.



FTX-602-PWR+

Each signal conditioner accepts six optical fiber sensor inputs for convenient three-phase monitoring of hot spots in generator and transformer windings, on bus bars in switch gear, or critical connection points on transmission cables and circuit breakers. The FTX-602-PWR+ is powered by 12~24VDC and includes isolated RS-485 serial connectivity over industry standard Modbus RTU protocol. Multiple transmitters can be connected in series on a standard 35mm DIN rail with power and RS-485 communication supplied by the five-pin T-Bus connector.



FTX-301-PWR+

Each signal conditioner accepts three optical fiber sensor inputs for convenient three phase monitoring of hot spots in generator and transformer windings, on bus bars in switch gear, or critical connection points on transmission cables and circuit breakers. The FTX-301-PWR+ model includes three isolated 4-20mA outputs that are loop powered from a 12~24VDC source. All transmitters include isolated RS-485 serial connectivity over industry standard Modbus RTU protocol. Multiple transmitters can be connected in series on a standard 35mm DIN rail with power and RS-485 communication supplied by the five-pin T-Bus connector.

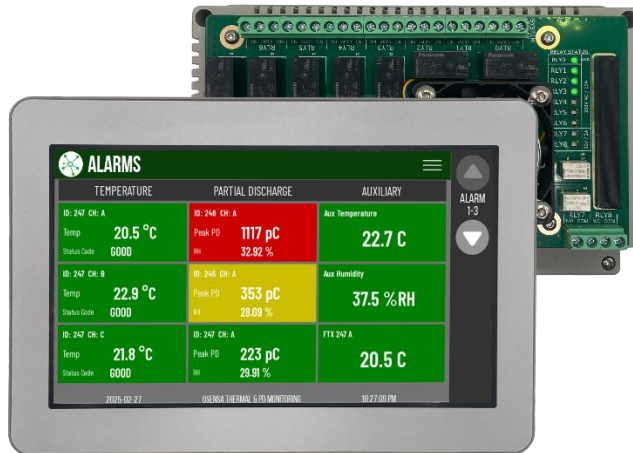


FTX-301-PWR+R

The FTX-301-PWR+R is a general-purpose industrial fiber optic temperature transmitter offering industry leading performance and reliability. Each signal conditioner accepts three optical fiber sensor inputs for microwave process control or monitoring of medium voltage electrical equipment such as switchgear, bus bars, motors, generators, cast resin transformers, circuit breakers, and diode heat sinks. Temperatures are reported on isolated 4-20mA outputs as well as digitally over a 3-wire RS-485 bus talking Modbus RTU protocol. Two form A relays can be programmed to trip on temperature thresholds or temperature deltas for hard-wired alarms.

- **Centralized Monitoring & Control Options**

OSENSA provides flexible hardware solutions to visualize data, manage alarms, and integrate thermal information into your broader control ecosystem.



- **HMI Touch Panel Display:** This dedicated human-machine interface serves as a local command center for your thermal monitoring system. Its intuitive, full-color touchscreen provides real-time temperature visualization for all connected sensors. The HMI-001-Relay is designed for robust functionality in industrial settings, featuring:
 - **High-Density Monitoring:** Support for up to 99 fiber optic sensor channels, 48 partial discharge sensing channels, and another 48 Auxiliary inputs from third party devices.
 - **Integrated Data Logging:** Almost unlimited data logging capability with Swissbit industrial 16 Gb USB flash drive.
 - **Ethernet Connectivity:** Built-in Ethernet for seamless integration into your plant network, enabling remote viewing and data access.
 - **9 Programmable Relays:** An intuitive interface for configuring high/low alarms, with programmable relay outputs to control external alarms, fans, lights, or shutdown sequences directly.

By leveraging OSENSA's advanced fiber optic sensing technology, industries can move beyond outdated maintenance practices, protect their most valuable electrical assets, and confidently meet the rigorous standards for reliability and safety set by NFPA 70B.

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