

Laying of Temperature-Sensing Optical Cables

Article Overview

Temperature-sensing optical cables should be carefully routed, fixed, and bent according to specific guidelines to ensure accurate temperature measurement and system reliability.

General Principles

Temperature-sensing optical fibers act both as signal carriers and temperature sensors, so installation quality directly affects measurement accuracy. Fibers are typically single-mode or multimode, selected based on the interrogation method and system requirements, and must comply with ITU-T standards for low loss and bend insensitivity .

Laying Techniques

- o Direct Laying: The fiber is fixed along the surface of the asset (bus duct, high-voltage cable, or power line) using insulated zip ties or flame-retardant ties. The fiber should maintain close contact with the surface to accurately sense temperature .
- o Winding Laying: For precise measurement at critical points (e.g., busbar joints), a double-loop winding or circular arc is used. The unfolded length of the loop should be at least 5 meters, and the fiber must maintain a minimum bending radius of 3-5 cm to prevent signal loss .
- o S-Shaped Routing: When monitoring multiple cables simultaneously, an S-shaped layout maximizes coverage and reduces fiber usage while ensuring all cables are monitored .

Fixing and Protection

- o Binding Spacing: Tie the fiber at intervals no greater than 50 cm, securing both the start and end of loops .
- o Fiber Margin: Leave extra fiber (fiber ring) to allow positioning, ambient temperature measurement, and protection during installation .
- o Connector Handling: Keep fiber end faces clean and protected with caps before connector installation to maintain measurement accuracy .
- o Environmental Protection: In high-humidity or harsh environments, use moisture-proof measures and insulation climbers to prevent condensation and maintain sensor performance .

Testing and Commissioning

- o Testing Sections: Reserve 20 m sections for system debugging and verification .
- o Fiber Slack: Leave 1 m of fiber every 100 m to prevent tension and damage during installation .

Considerations for Power Utilities

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- o Cable Positioning: Avoid soil or loose media between the fiber and conductor to ensure accurate temperature readings .
- o Thermal Coupling: Ensure all materials between the fiber and conductor are known to optimize distributed temperature sensing accuracy .
- o Noise Mitigation: Route fibers away from vibration sources to reduce interference in distributed acoustic or temperature sensing systems . By following these methods--direct or winding laying, proper fixing, maintaining bending radius, environmental protection, and testing sections--temperature-sensing optical cables can provide reliable, high-accuracy monitoring for bus ducts, high-voltage cables, and power utility systems.

Measure temperature with fiber optic sensors for high-resolution distributed and multipoint monitoring in batteries, processes, and

Distributed Temperature Sensing (DTS) system monitors temperature over long

Distributed Temperature Sensing (DTS) system is ideal for detecting fire and monitoring temperature profiles over long-distances.

Dive into the principles of Distributed Temperature Sensing (DTS) with Silixa. Explore optical fiber technologies for diverse

The temperature sensing optical fiber of the cable optical fiber temperature measurement system should be equipped

To estimate the temperatures of conductor and XLPE (cross-linked polyethylene) insulation of the submarine cable

The DTS can quickly measure a continuous temperature distribution over a wide range and long distance, rather than a single point

This paper studies a distributed optical fiber temperature measurement system using smart cables, which combines fiber Bragg

What Is Distributed Temperature Sensing? Distributed temperature sensing (DTS) measures temperature distribution over the length

With over 130 years in the cable industry, NKT collaborates closely with sensor system suppliers, such as

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Distributed Temperature Sensing (DTS) systems provide temperature information for accurate thermal monitoring, fire detection, and

Unlike traditional electrical temperature-measurement devices such as thermo-couples and RTDs, the entire length of the fiber-optic

This document provides guidance on best practice for the selection and installation of cables for fiber optic sensing in the power

High-speed and Wide-range Temperature Monitoring The DTS can quickly measure a continuous temperature distribution over a

The status of an optic-electric composite high-voltage submarine cable (referred to as submarine cable) can be

AP Sensing's fiber optic sensor cables enable real-time, precise monitoring of temperature, strain & acoustics in harsh environments

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