

Article Overview

Relay protection can be safeguarded from lightning by combining surge protection devices, proper grounding, equipotential bonding, and adherence to standards like IEC 62305 and NFPA 780.

Key Measures

1. **Surge Protection Devices (SPDs)** SPDs are installed at points where power, signal, and data lines enter relay panels or switchgear. They remain passive under normal operation but conduct excess voltage to the ground during a lightning surge, preventing damage to sensitive relay circuits . SPDs should be installed as close as possible to the equipment with the shortest cable paths to minimize voltage differences . 2. **Grounding and Equipotential Bonding** A low-resistance grounding system ensures that lightning currents are safely dissipated into the earth. For critical relay protection, ground resistance should ideally be below 10 ohms, and below 1 ohm for highly sensitive or critical infrastructure . Equipotential bonding connects all exposed conductive parts to the same reference potential, reducing dangerous voltage differences that could damage relays . 3. **External Lightning Protection** Air-termination devices (lightning rods) and down conductors intercept direct lightning strikes and channel the current safely to the grounding system. This prevents high-energy strikes from reaching relay panels and other sensitive equipment . 4. **Internal Protection and Coordination** Relays should be coordinated with upstream breakers and fuses to isolate faults quickly. This layered protection ensures that overvoltages or surges do not propagate through the system, protecting both the relay and connected equipment . Regular testing and maintenance of relays, SPDs, and grounding systems are essential to maintain effectiveness . 5. **Compliance with Standards** Following IEC 62305 and NFPA 780 ensures that lightning protection systems are designed according to recognized risk assessment and installation practices. These standards cover the selection of protection classes, lightning protection zones, and installation requirements for both external and internal protection . 6. **Additional Measures**

- o Use shielded and twisted pair cables for signal lines to reduce induced surges.
- o Implement remote monitoring to detect and respond to lightning-induced events quickly.
- o Periodically inspect and replace corroded or damaged conductors, connections, and SPDs . By integrating these measures, relay protection systems can maintain operational reliability and prevent damage from lightning strikes and associated surges.

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Complete IEC 62305 lightning protection guide covering risk assessment (Part 2), LPS classes I-IV, rolling sphere

Lightning protection relay protection

IEEE-SA Standards Board Abstract: Information on the concepts of protection of ac transmission lines is presented in this guide.

Protect critical components in your power system with a wide range of SEL protective relays covering applications and use cases

A complete lightning protection system uses air terminals, conductors, bonding, grounding electrodes, and surge

Learn about protective relays, their working principle, types, and applications in power

Lightning protection systems provide a safe path for electricity to travel to the ground without causing damage to the

Lightning protection and grounding systems are the final component systems in best-practiced electrical

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Relay protection coordination study on 150 kV high voltage transmission network Short

Learn how protective relays detect faults, trip breakers, coordinate protection zones, and

Plant protection system functional testing Protective circuit functional testing, including lockout relay testing, must take

ABB offers grid components for connection, protection and control from vacuum circuit breakers to protection relays and sensors, for

Relay protection circuitry This handbook covers the code of practice in protection circuitry

Protective relays are vital for safeguarding power systems, ensuring protection against faults and abnormalities. This

This article breaks down what electrical protection actually covers, which devices and systems matter most, how

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