

Temperature Requirements for Relay Protection Devices

Article Overview

Relay protection involves monitoring and controlling temperature to ensure reliable operation and prevent overheating, with specific thresholds for warnings and disconnection.

Temperature Effects on Electromechanical Relays

The operating characteristics of electromechanical relays, such as pick-up voltage (VPI) and coil resistance (RC), are directly affected by temperature. Relay coils are typically made of copper, whose resistance increases with temperature. Since the pick-up current remains constant, the pick-up voltage varies proportionally with coil resistance. This means that at higher temperatures, the voltage required to actuate the relay increases, potentially affecting performance if not accounted for in design. The standard reference temperature for specifying relay parameters is often 23°C, providing consistency across international standards.

Temperature Monitoring Relays

Temperature monitoring relays are used to measure and protect electrical equipment such as motors, transformers, busbars, and control cabinets. These relays work with sensors like PT100, PT1000, NTC, or PTC to detect overtemperature or undertemperature conditions. Modern smart relays allow configuration via LCD or smartphone apps and can integrate with communication protocols like Modbus RTU for remote monitoring. They can trigger alarms or disconnect circuits when temperature thresholds are exceeded, preventing damage to equipment.

Overtemperature Protection in Solid-State Relays

Solid-state relays (SSRs) also require temperature protection. Reference designs implement two-level overtemperature protection: a warning stage and a critical stage. For example, a visual warning may activate between 60°C and 90°C, while the relay disconnects the load if the temperature exceeds 90°C. This ensures sensitive components are protected and system reliability is maintained.

Standards and Guidelines

Standards such as IEEE Std C37.90 define thermal ratings, temperature ranges, and testing requirements for relays and relay systems. These standards provide guidance on designing relays to withstand temperature variations and ensure safe operation under normal and fault conditions.

Key Takeaways

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- o Relay coil resistance and pick-up voltage change with temperature; proper design must account for these variations.
- o Temperature monitoring relays provide real-time protection for equipment by detecting overtemperature conditions.
- o Solid-state relays require overtemperature protection to prevent damage, typically with warning and shutdown thresholds.
- o Adhering to standards like IEEE C37.90 ensures reliable and safe relay operation across temperature ranges. By integrating temperature monitoring and protection mechanisms, relay systems can maintain performance, prevent overheating, and extend equipment lifespan.

Types and Revolution of Electrical Relays Introduction: Protective relays work in concert with sensing and control devices to

In the design of electrical power systems, the ANSI Standard Device Numbers denote what features a protective

Use of the relay in an atmosphere at standard temperature and humidity with minimal amounts of dust, SO₂, H₂S, or organic gases

The paper introduces the thermal design process of the relay protection device processing equipment, from the single

This handbook covers the code of practice in protection circuitry including standard lead and device numbers, mode of

IEC 60255-149:2013 specifies minimum requirements for thermal protection relays. This standard includes specification of the

It is planned that the work being carried out by this group will be coordinated with the existing IEC 60255-1xx series

Introduction to Protective Relaying What are Protective Relays, or Protection Relays? Protective relays are

Relays in the Hot Box Fernando Gutierrez, Imperial Irrigation District Roy Moxley, David Kopczynski, and Dan Holmes, Schweitzer

The types of protective relays that exist are overcurrent, electromechanical, directional, distance, pilot, and

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differential

A protection relay is a crucial component of electrical systems that safeguard infrastructure, employees, and

Transformer protection relays are used for protection, control, measurement and supervision of power transformers.

Protection System Elements Protective relays Circuit breakers CTs and VTs (instrument transformers)
Communications channels

Safety Precautions for All Relays Refer to the Safety Precautions for individual Relays for precautions specific to each Relay.

The impact of different electrical parameters and system performance considerations on the selection of relays and protection

Why Transformer Protection Devices Are Critical Basic protection features like

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