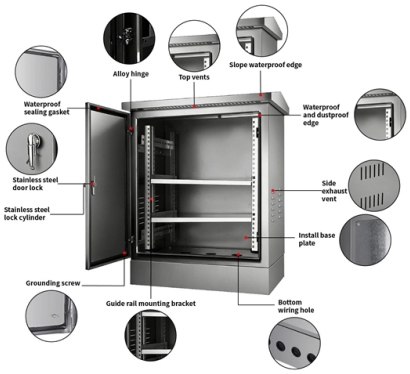
Measuring DC Resistance in Relay Protection



Overview

These tests are done to show that protection relays are free from defects during manufacturing process.

Key Takeaways

DC resistance measurement is a critical diagnostic tool for ensuring the integrity and reliability of relay protection circuits in substations.Purpose of DC Resistance Measurement

DC resistance measurement in relay protection systems is primarily used to verify the health of the DC control circuits, including wiring, relay contacts, auxiliary relays, and circuit breaker coils. It helps detect high-resistance connections, inadvertent DC grounds, and contact degradation, which can compromise relay operation during fault conditions . Accurate resistance measurement ensures that protective relays respond correctly and reliably under abnormal power conditions.

Measurement Methodology

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DC Resistance Testers: Specialized instruments apply a known DC current and measure the resulting voltage drop to calculate resistance. Modern testers can achieve accuracy within ±0.5%, making them suitable for a wide range of resistances in relay circuits .

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Circuit Isolation: Before measurement, the circuit under test must be isolated from auxiliary supplies and other connected devices to prevent interference and ensure safety .

•

Contact Resistance Verification: Measuring the resistance across relay contacts and breaker trip/close coils helps identify worn or oxidized contacts. Low-resistance paths are essential for proper relay actuation .

•

Ground Detection: By measuring voltage across high-value resistors connected to the DC bus, inadvertent positive or negative DC grounds can be detected. Deviations from nominal voltage ratios indicate potential faults in the DC wiring .

Practical Applications
• Maintenance and Troubleshooting: Regular DC resistance checks help prevent relay maloperation due to high-resistance connections or partial shorts.

• Commissioning: During relay installation, DC resistance measurement verifies that all circuits meet design specifications and standards such as IEC 60255 .

• Predictive Diagnostics: Trends in resistance measurements over time can indicate deterioration of contacts or wiring, allowing proactive maintenance before failures occur.
Key Considerations
• Ensure auxiliary DC supply is stable during testing to avoid false readings.

• Use high-precision instruments for low-resistance measurements, especially in microprocessor-based relays.

• Follow manufacturer guidelines and relevant standards for test voltage, duration, and pass criteria . In summary, DC resistance measurement is an essential procedure for maintaining the reliability and safety of relay protection systems, enabling early detection of circuit issues, ensuring proper relay operation, and supporting compliance with industry standards.

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Article Content

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Measuring relays / Monitoring relays

Our measuring and monitoring relays are available in different versions and detect and signal at an early stage when critical limit

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PROTECTIVE RELAY TESTING

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How the relay contact resistance is measured?

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Protective Relay Testing and Maintenance Overview

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Protection Basics

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Review What is the function of power system protection? Name two protective devices For what purpose is IEEE device 52 used?

FIST 3-8-March18-2010

The protection system as defined in this volume includes —protective relays, associated communications systems, voltage and

Operation, maintenance, and field test procedures for protective relays

The protection circuits include all low-voltage devices and wiring connected to: instrument transformer secondaries,

Types of Protective Relays

This article covers various types of protective relays, such as overcurrent, directional, and differential relays, highlighting their

General Purpose Relays

The shock resistance of a relay is divided into two categories: Destruction, which quantifies the characteristic change of, or damage

MONITORING RELAY Trip circuit supervision relay TCS Product

Extremely low burden on auxiliary source Complete range of rated AC / DC voltage Operation indication for trip circuit healthy and

Distance Relay: Types, Diagrams, and Working Principles

A distance relay is a protective device that measures line impedance to detect and isolate faults in high-voltage

Eight most important distance relay characteristics (based on ...

Distance relay impedance Some numerical relays measure the absolute fault impedance and then determine whether

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Distance Relay – Definition, Working Principle, Formula, Derivation ...

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A distance relay (or impedance relay) is a protection device used on power transmission lines that estimates the

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How to Measure Resistance with a Digital Multimeter | Fluke

Resistance is measured using analog or digital multimeters. These tools also measure current, voltage, and more for various

CSM_Measuring_MonitoringRY_TG_E_1_1

Monitoring the status of the main power circuits for industrial machines and production equipment and protecting devices from low

Commissioning tests of protection relays at site

General inspection of the equipment, checking all connections, wires on relays terminals, labels on terminal boards,

Coil resistance for relays

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A few years ago the board was burnt near a relay contact therefore I looked at the board as the primary culprit. I am

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