Braking coil of relay protection

Article Overview

A braking coil in relay protection refers to the use of suppression techniques across a relay coil to control the release speed, prevent voltage spikes, and protect the driving circuitry.

Purpose of a Braking Coil

When a relay coil is de-energized, the collapsing magnetic field generates a back electromotive force (Back EMF), which can reach hundreds or thousands of volts. This transient voltage can damage solid-state relay drivers or other electronic components in the control circuit . A braking coil or suppression device provides a controlled path for the coil current to decay, reducing the peak voltage and ensuring safe operation. In protective relays, which are designed to trip circuit breakers during faults, rapid and reliable release of the relay armature is critical. Without suppression, the armature may open slowly, bounce, or even reverse momentarily due to residual magnetic forces, potentially delaying breaker operation and compromising system protection .

Common Suppression Techniques

Several methods are used to implement a braking coil effect:

o Diode across the coil (flyback diode): Provides a path for the induced current, limiting voltage spikes. While effective at protecting the driver, it slows the relay release time, which can be problematic in fast-acting protection circuits .
o Diode in series with a Zener diode: Placed in parallel with the coil, this arrangement allows faster release while still suppressing voltage spikes, optimizing both protection and relay dynamics .
o Metal-Oxide Varistor (MOV): Clamps voltage spikes but may have higher clamping voltage, suitable when the driver can tolerate it .
o Resistor or resistor-diode combinations: Can be used to control the decay of coil current, balancing protection and release speed .
o Resistor-capacitor snubber: Less common today due to cost and complexity, but can also limit transients .

Application in Protective Relays

Protective relays, whether electromechanical or solid-state, rely on coil actuation to trip breakers. The braking coil or suppression ensures that:

o The relay armature releases promptly after de-energization.
o Contact bounce is minimized, preserving contact life.
o The driving electronics are protected from high-voltage transients.

o The relay operates reliably under fault conditions, maintaining system safety . In modern systems, microprocessor-based relays may emulate these functions digitally, but electromechanical relays still benefit from physical coil suppression to maintain fast and reliable operation .

Key Considerations

o The choice of suppression method affects release time, contact life, and driver protection.
o For DC relays, a simple diode may slow release, while a diode-Zener combination provides a better compromise.
o Correct polarity is essential when using diodes; incorrect installation can prevent relay operation . In summary, the braking coil in relay protection is a critical design feature that controls the decay of coil current, protects the driving circuitry, and ensures reliable and fast operation of protective relays in power systems.

In high voltage and high current systems, circuit protection is usually provided by relays or circuit breakers.

Protective Relaying Principles and Applications The article provides an overview of protective relaying principles and their

The solenoid operated relay has a coil wound around a core that produces magnetic field when the coil is energised by the current

However, relays R"bc do not cover the failure of the circuit breakers themselves. To guard against this contingency,

In most of the DC relays we use a diode (like in the pic below) to protect the components like transistors, MOSFETs

A primary motor protective element of the motor protection relay is the thermal overload element and this is accomplished through

What measures can be taken to protect the relay itself and handle electrical surges and spikes in an industrial

Working principle The current relay electronically disconnects the brake coil from the DC voltage without contact, thereby also

Wiring procedures, appropriate grounding, disconnects, and over-current protection are very crucial. When

Definition of Protective Relay A protective relay is an automatic device that detects abnormalities in an electrical

Braking coil of relay protection

These relays can be made bistable, maintaining a contact closed with no coil current and requiring reverse

To protect the relay from the impact of overvoltage breakdown and ensure the safe and efficient conduct of high-voltage breaking

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

The resulting Back EMF can, if it appears across the electronic circuit driving the relay coil, be enough to

Protective relays and devices have been developed over 100 years ago to provide "last line" of defense for the electrical systems.

Braking Resistor: Working Principle, Types, Protection Circuits, and Comparison A braking resistor helps you control excess energy

Web: https://millstraining.co.za