Patents in the field of relay protection



Overview

Various embodiments are generally directed to a relay protection system that can detect a short to ground condition on an output of a relay. The relay protection system can bias an output...

Key Takeaways

Recent patents in relay protection cover transformer differential relays, digital protective relays, and advanced fault detection systems.

Transformer Protection Relay Patents

One notable patent, WO2019150619A1, describes a transformer protection relay device that calculates differential currents between primary and secondary windings to detect faults. The device determines the operating phase of a current differential relay and identifies the faulted phase based on phase current maxima and winding connection information, improving accuracy in transformer fault detection. This approach enhances the reliability of transformer protection by precisely identifying the accident phase.

Digital and Microprocessor-

Based Relays

Digital protective relays, also called microprocessor-based relays, integrate multiple protection functions, metering, communication, and self-test capabilities. These systems sample voltage and current values from power lines, process the data using software algorithms, and can synchronize sampling across multiple relays using GPS signals. Such relays are capable of bus total overcurrent protection and system-wide fault detection.

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved

They represent a shift from traditional electromechanical relays to software-driven, highly configurable protection devices.

Advanced Relay Structures

The U. S. Patent 12,626,875 focuses on a relay with a movable magnetizer and anti-short circuit structure to improve high-voltage DC relay performance.

The design addresses contact bounce and short-circuit handling while maintaining compactness and reliability. The movable magnetizer adjusts according to current flow, enhancing the relay's ability to withstand short-circuit conditions without compromising breaking ability.

Distributed and Intelligent Protection Systems

European Patent EP3018782B1 describes a distributed protection relay device that separates merging units and intelligent electronic devices (IEDs) for monitoring, control, and protection. The system collects analog and digital measurements from transformers and other equipment, transmits them via a process bus, and executes protective control commands. This architecture supports substation automation, real-time monitoring, and fault isolation.

Specialized Fault Detection Techniques

Patents also cover inrush current detection using Rogowski coils and methods for detecting loss of current transformer connections. These innovations allow relays to distinguish between normal transformer inrush currents and actual faults, preventing unnecessary tripping and improving system stability.

Summary

Patents in relay protection focus on: Transformer differential relays for accurate fault phase detection. Digital/microprocessor relays with integrated protection, metering, and communication. Relay structural innovations for high-voltage and DC applications.

Distributed and intelligent protection systems for substation automation. Advanced fault detection methods, including inrush current and CT connection monitoring. These patents collectively enhance the accuracy, reliability, and automation of modern power system protection.

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved

Article Content

EP3446391B1

Various embodiments are generally directed to a relay protection system that can detect a short to ground condition on an output of a relay. The relay protection system can bias an output...

WO/2025/077355 RELAY PROTECTION EXTERNAL OPERATION

This patent search tool allows you not only to search the PCT database of about 2 million International Applications but also the worldwide patent collections. This search facility features: flexible search

Protective relay patented technology retrieval search results

In electrical engineering, a protective relay is a relay device designed to trip a circuit breaker when a fault is detected.

51 results about "Digital protective relay" patented technology

In utility and industrial electric power transmission and distribution systems, a digital protective relay is a computer-based system with software-based protection algorithms for the detection of electrical

US Patent Application for Relay Protection Patent Application ...

A relay protection device is disclosed for use with a magnetic latching relay, the relay having two stable states. The relay comprises an electromagnetic device which under the effect of a switching impulse

U.S. Patent Application for PROTECTION RELAY Patent Application ...

Protection relay 50 in FIG. 2 is configured similarly to a so-called digital relay device. Specifically, referring to FIG. 2, protection relay 50 includes an analog input circuit 51, an arithmetic

RELAY PROTECTION SYSTEM

If a short to ground condition is detected, the relay protection system can prevent the relay from transitioning from an open position to a closed position. As a result, a power source can remain

SOLID STATE RELAY MODULE WITH OVERCURRENT

This disclosure is directed to a solid state relay (SSR) module with overcurrent protection. In contrast to traditional mechanical relays or contactors which uses spring loaded terminals, the SSR

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved

Transformer protection relay device

The calculation method will be described later. (First embodiment) Drawing 1 is a figure showing the composition of transformer protection relay system 1 of an embodiment. The transformer protection

US20200335962A1

A relay protection device is disclosed for use with a magnetic latching relay, the relay having two stable states. The relay comprises an electromagnetic device which under the effect of a switching impulse

Relay Protection Using Inductive Coils: A Resource-Saving Approach

This paper presents the development and principle of operation of resource-saving overcurrent protection, which is an alternative to traditional current protections. The experiments

ITPro Today, Network Computing, IoT World Today combine

ITPro Today, Network Computing and IoT World Today have combined with TechTarget . The page you are looking for may no longer exist.

Research on Relay Protection Technology Based on Smart Grid

Relay protection, as the first line of defines to ensure the safe operation of the power grid, needs to actively adapt to the power grid reform. The thesis first introduces the related technologies of relay

Research of the system-on-chip-based relay protection ...

This paper presents a chip-based relay protection technology based on system-on-chip (SoC), which is described from four aspects, namely, the architectural design of the relay protection

The Relay That Changed the Power Industry

Edmund Schweitzer with the first digital microprocessor-based protective relay, the SEL-21 digital distance relay/fault locator , and the SEL

The value and development of relay protection technology in modern ...

With the large-scale integration of renewable energy into modern power systems, relay protection technologies are encountering both challenges and opportunities. This paper reviews key

Protective relay patented technology retrieval search results

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved

This page includes the patent name, patent number, legal status, invention/applicant, technical efficacy and accompanying drawings of Protective relay-related invention patents and utility model patents,

Power System Protective Relays: Principles & Practices

Abstract: Protective relays and devices have been developed over 100 years ago to provide “last line” of defense for the electrical systems. They are intended to quickly identify a fault and isolate it so the

Contact Us

Continue your research online:

Website: https://fdsoluciones.es
Technical inquiry: https://fdsoluciones.es/project-enquiry.html

This document is for preliminary research. Verify specifications against current standards, product documentation and project requirements.

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved