

Calculation of bus voltage for relay protection



Article Overview

The voltage across a bus protection relay is calculated based on the total fault current flowing through the relay's series resistance, with settings adjusted above the maximum expected voltage to account for CT saturation and safety margins.

Basic Principle

In bus differential protection, the relay voltage V_r is generated by the current transformers (CTs) connected to all terminals of the bus. Under normal conditions, the sum of currents entering the bus is zero, so no voltage develops across the relay. During a fault, the currents no longer sum to zero, producing a voltage across the relay proportional to the fault current and the relay's series resistance .

Calculation Steps

- **Determine Maximum Fault Current:** Calculate the maximum possible fault current for each CT circuit, assuming total CT saturation. This ensures the relay setting accounts for worst-case conditions .
- **Compute Relay Voltage:** For a high-impedance relay, the voltage across the relay is given by: $V_r = I_f \times R_r$ where I_f is the fault current through the CT and R_r is the series resistance of the relay circuit .
- **Include CT Characteristics:** Assume the CT is toroidal with negligible leakage reactance. If non-toroidal CTs are used, the leakage reactance must be included in the calculation, as it affects the voltage developed across the relay .
- **Apply Safety Margin:** Set the relay voltage above the calculated maximum by a ty...

Article Content

Exploring the IEEE C37.234 Guide for Protective Relay Application to ...

In the Guide, concepts of power bus protection are discussed. Consideration is given to availability and location of breakers, current

Type KAB High Impedence Bus Relay

A high impedance bus differential relay will be sub-jected to high continuous voltage and will result in damage if any one ct is either

Relay Settings Calculations - Electrical Engineering

This technical report refers to the electrical protection of all 132kV switchgear. These settings may be re-evaluated during the

SWITCHGEAR AND PROTECTION

Calculation of Supervisory Relay: ay is over voltage relay. So, we have to calculate the pic Neglecting magnetizing currents of the

Relay Setting Calculation Overview | PDF | Volt | Relay

The calculations are performed to determine appropriate relay settings that ensure protection and coordination within the power

Fundamentals of Modern Protective Relaying

Instrument Transformers • Supply accurately scaled current and voltage quantities for measurement while insulating the relay from

Bus Protection Theory

High-impedance voltage differential protection is a solution to the challenge of CT saturation during external faults, as the high

Relay Protection in HV/MV Substations: Calculations, Settings ...

Introduction Relay protection is essential to ensure the stability, reliability, and safety of electrical power systems. In

Distribution Automation Handbook

When the protection is implemented using a voltage relay, the selected setting must be equal to or exceed the calculated stabilizing

High Impedance Busbar Protection Guide | PDF | Relay | Resistor

1. The document discusses high impedance busbar protection, including both voltage-operated and current-operated relay types. It

A Guide for Calculating Step Distance Relay Settings

Calculating & Storing Relay Setting Philosophy Utilities can use a Word document or spreadsheets to document the step-by-step

Basics of Protective Relaying and Design Principles

Particularly, the following issues are re-enforced: load flow and short-circuit calculations, selecting the protective equipment, setting

BUSBAR PROTECTION

A bus differential protection scheme, regardless of the type of relay used, simply compares the current entering the bus with the

Microsoft Word

The detailed design of the relay and control circuit protection will usually depend upon the high voltage bus arrangement and the

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