Uneven voltage at the 35kV busbar



Overview

35kV RMU Busbar Failure Due to Installation Errors When the fault occurred, the voltage of phases A and C on the 35kV busbar No.1 rose to line voltage whil.

Key Takeaways

Uneven voltage at a 35kV busbar is typically caused by single-phase-to-ground faults, blown fuses, resonance, or uneven current distribution due to busbar configuration and proximity effects. Common Causes1. Single-Phase-to-Ground Faults: The most frequent cause of voltage imbalance is a single-phase-to-ground fault, where one phase contacts the ground or conductive objects.

This causes the faulted phase voltage to drop significantly, while the other two phase voltages rise, sometimes up to √3 times the normal phase-to-ground voltage. In low-current grounding systems, the busbar may issue a grounding alarm without tripping the relay, and the neutral point displacement voltage alters the three-phase voltages, creating an uneven voltage profile across the busbar. 2.

Blown Fuses: High-voltage or low-voltage fuse blowouts can lead to voltage drops in the affected phase. A completely blown high-voltage fuse causes the secondary voltage of that phase to drop sharply, potentially triggering a busbar grounding signal. Partial fuse damage may not trigger alarms but still results in voltage imbalance.

3. Resonance (Ferroresonance): Ferroresonance can cause all three-phase voltages to rise abnormally while remaining balanced. This phenomenon may produce buzzing sounds from voltage transformers and overvoltages up to 1.

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5–3. 5 times the normal phase voltage. Although the three-phase voltages are balanced, the busbar may still experience operational stress.

4. Uneven Current Distribution: Busbar configuration, skin effect, and proximity effect can cause uneven current flow in AC systems. Conductors in the middle of a busbar may carry less current than outer conductors, leading to localized heating and voltage drops.

This effect is more pronounced at high currents and frequencies, and it can exacerbate voltage imbalance across the busbar.

Troubleshooting and Handling

Visual Inspection: Check for loose connections, corrosion, or signs of arcing on the busbar and connected equipment. Voltage and Current Monitoring: Measure phase voltages, line voltages, and busbar currents to identify the affected phase and quantify the imbalance.

SCAD

A and Protection Signals: Analyze busbar grounding alarms, arc suppression coil currents, and $3V_0$ readings to distinguish between single-phase faults, fuse blowouts, and resonance. Trial Switching: After confirming a fault, trial tripping of lines can isolate the affected section while minimizing disruption. Load Balancing and Connection Improvements: Ensure even load distribution and secure connections to reduce voltage drops and overheating.

Thermal Imaging: Detect hotspots caused by uneven current distribution or poor connections.

Summary

Uneven voltage at a 35kV busbar is usually a result of phase faults, fuse issues, resonance, or busbar current distribution effects. Accurate diagnosis requires combining phase voltage measurements, SCADA signals, visual inspections, and current monitoring. Corrective actions include isolating the faulted phase, repairing fuses, balancing loads, and improving busbar connections to restore voltage symmetry and ensure safe operation.

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Article Content

35kV RMU Busbar Failure Due to Installation Errors

When the fault occurred, the voltage of phases A and C on the 35kV busbar No.1 rose to line voltage while the voltage of phase B approached zero. This is

Common phenomena and causes of three-phase voltage unbalance

In the neutral ungrounded system, there are various causes of voltage unbalance, the most common of which are disconnection of the high and low voltage sides (fuse blowing) and

Judgment and treatment method of 35 kV system voltage anomaly

(1) Abnormal measurement circuit: The voltage below the 35 kV busbar transformer is abnormal, but the primary voltage is actually normal. The most likely causes are: high-voltage fuse,

The Effects of Unbalanced Circuit in Power Losses and Efficieny

When one phase becomes more loaded than the other phase, the voltage in that phase will be low, leading to a voltage imbalance. Even distribution of loads helps prevent overloading of one phase.

What causes three-phase voltage imbalance? How to govern?

To govern three-phase voltage imbalance, it is important to identify and address the root cause. Here are some specific causes and solutions to reduce voltage imbalance.

Busbar Testing Procedure

Discover the essential procedures & best practices for successful busbar testing. Our comprehensive post covers preparation, equipment setup, testing methods, and safety

35kV Distribution Line Single-Phase Ground Fault Handling

In a solid (metallic) ground fault, the faulted phase voltage drops to zero, and the other two phase-to-ground voltages increase by √3 times, while line voltages remain unchanged.

Detection and assessment scheme of voltage and current unbalance

This paper describes a protection scheme for voltage and current unbalance in synchronous generators. The scheme is based on dual numerical techniques application utilizing

Imbalance and Countermeasures Analysis on 35 kV Busbar Voltage of ...

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For certain 35 kV shorter transmission line with neutral point not to earth directly,the imbalance of three-phase voltages of busbar is occurred due to serious asymmetry of three-phase capacitor parameters

Dielectric Testing of Busbars: A Practical Guide for Electrical ...

This guide provides a comprehensive overview of dielectric testing for busbars, covering the key testing methods, steps, and practical considerations for ensuring the insulation integrity of

Indoor JYZ Busbar Insulators: Engineering Solutions for Low-Voltage ...

Industry Background: Addressing Critical Insulation Challenges in Electrical Distribution Systems Modern electrical distribution systems face persistent safety and reliability challenges that

Novel busbar protection scheme for impedance-earthed distribution ...

This paper addresses the problem of protection blinding and focuses on busbar protection in the case of LG faults in impedance-earthed networks. The method is based on detecting the zero

The essence of understanding and analyzing

Distribution systems 5kV-35kV The distribution system shown below illustrates many of the features of a distribution system making it unique. The

Judgment and treatment method of 35 kV system voltage anomaly

Inspection found that the 35kV Section II busbar voltage transformer A, C phase low voltage fuse blew, after replacing the low voltage fuse, Section II voltage Ua=3 kV, Ub=36 kV, Uc=33

Busbars carrying uneven current due to proximity effect?

Let us consider that, the busbars are carrying 3000 A AC current. In DC system, the busbars carry similar current, because skin effect and proximity

35 kV busbar_Baiduwiki

The 35 kV busbar is a critical node in the power system at the 35 kV voltage level, used for collecting and distributing electrical energy, connecting the generation side with the transmission network. Its

Medium Voltage Switchgear

ABB''s medium voltage switchgear (1 kV to 52 kV according to the IEC standards) are designed to connect and protect an evolving grid.

Analysis of Electromagnetic Parameters of Laminated Busbar

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The uneven distribution of inductance and resistance will cause the voltage and current of the components connected at different positions on the laminated busbar to be inconsistent, which

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

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