How to handle grounding of 35KV busbar lines



Overview

What caused the 35kV busbar grounding fault Tripping incorrectly for an external fault may cause large outages, and jeopardize power system. The 35 kV syst.

Key Takeaways

A 35kV busbar is typically grounded through a neutral point connection, often using an arc suppression coil (Petersen coil) to limit fault current and detect single-phase-to-ground faults.

Neutral Grounding Approaches

For 35kV distribution busbars, the neutral point can be grounded in several ways: Solid (metallic) grounding: The neutral is directly connected to ground, resulting in high fault currents during a ground fault. This method allows fast fault detection but can stress equipment. In a solid ground fault, the faulted phase voltage drops to zero, while the other two phase-to-ground voltages rise by √3 times, and the busbar issues a grounding alarm.

Resonant grounding using an arc suppression coil: A Petersen coil is connected between the neutral and ground to compensate for the capacitive current of the system. This limits the ground fault current to a low value, reducing equipment stress and arc flash hazards. The coil carries a current equal to the compensation current corresponding to its tap setting, and a “busbar grounding” signal is generated when a displacement voltage occurs.

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Low-resistance grounding: A resistor is inserted between the neutral and ground to limit fault current to a safe level while allowing sufficient current for protective relays to operate. This method is less common in 35kV distribution systems but may be used in specific industrial applications.

Fault Detection and Protection

Voltage transformers (VTs) monitor phase-to-ground voltages. During a single-phase-to-ground fault, the VT indicator for the faulted phase dims, while the other two brighten, and the $3V_0$ output can be used to detect the fault. Relay protection schemes include overcurrent-based interlocking, differential protection, and high-impedance or percentage differential protection.

These relays detect abnormal currents or voltage displacements and trigger alarms or circuit breaker operations.

SCAD

A integration allows remote monitoring and trial switching to isolate the faulted line while maintaining service to healthy sections. Critical users are notified before switching, and the arc suppression coil is monitored to prevent overheating.

Operational Considerations

When a ground fault occurs, the busbar may issue a grounding alarm. Operators inspect the substation equipment, check the arc suppression coil current and temperature, and identify the faulted line using small-current fault line selectors or visual inspection. Faulted equipment should be isolated promptly, typically within 2 hours, to prevent escalation into phase-to-phase faults and to protect the arc suppression coil.

In systems with parallel busbars, busbar switches can be opened or closed to decouple sections and identify the fault location based on voltage changes.

Summary

The 35kV busbar grounding method primarily relies on connecting the neutral to ground, often through an arc suppression coil to limit fault current and facilitate detection. Protective relays, VTs, and SCADA systems work together to monitor, detect, and isolate ground faults efficiently, ensuring system stability and safety while minimizing equipment damage and arc flash hazards.

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Article Content

What caused the 35kV busbar grounding fault

Tripping incorrectly for an external fault may cause large outages, and jeopardize power system. The 35 kV system in the power system is either ungrounded or grounded via an arc suppression coil. How to

Bus Protection Theory

Multiple segment busbars, such as double busbar and triple busbar arrangements, are used to balance loads between various transmission circuits, minimize the physical space required for a substation,

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How are the grounding resistor value and grounding transformer for a

The main purpose of using neutral resistor grounding for the 35 kV substation system is to limit system overvoltage and achieve fast and accurate fault line selection under single-phase

The essentials of LV/MV/HV substation bus overcurrent and

When industrial power systems are grounded through a resistance or reactance to limit fault damage, the short-circuit current available to detect a ground fault is small and requires

The Basics of Substation Grounding: Parts of the Grounding System ...

Learn about the practical tips for carrying out the measurements. One of the vital aspects of the protection of people and equipment in electrical substations is the provision of an adequate

Top Busbar Protection Issues That Worry Protection Engineers

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According to the reviewed literature, differential protection systems are employed by larger substations, whereas overcurrent relays are utilized by smaller distribution substations that

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Guidelines for grounding electrical cables, busbars, and cable trays in wiring projects, ensuring safety and compliance with industry standards.

Grounding Practices in Power Distribution Systems

Location and Installation: Grounding transformers should be strategically placed, often at substations or along distribution lines. This is particularly important when

35kV Distribution Line Single-Phase Ground Fault Handling

II. Handling Process for 35kV Auxiliary Bus Single-Phase-to-Ground Faults When a 35kV line grounding fault occurs, the Wan''an substation''s 35kV busbar issues a grounding alarm.

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Generally, the busbar side of 10kV switchgear does not have a dedicated earthing switch. When maintenance is required on the busbar itself or

Earthing guide for surge protection

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Introduction At Eaton, we believe it is possible to provide economic and practical surge protection for virtually all electronic systems. However, the pro-tection provided depends crucially on the quality of

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