10kV Bus Capacitive Current Test Results



Overview

The invention discloses a 10kV bus capacitor current monitoring method, which adopts a voltage transformer connected to a power grid in an open delta connection method to realize the input...

Key Takeaways

10kV bus capacitive current tests measure the current flowing through bus capacitances to ground, providing key indicators of system health and insulation performance.

Test Methods

Direct Measurement: The most accurate method involves passing the capacitor pins through an air-core coil and measuring the voltage across a series sampling resistor. This allows the formation of a real-time database of capacitive currents for both the system bus and ground capacitance, while avoiding direct contact with the power grid, enhancing safety. Using a measurement signal with a frequency different from the power frequency improves accuracy by minimizing interference from the 50/60 Hz system voltage.

Indirect Measurement: Common approaches include the neutral point plus capacitance method and secondary injection methods. These are less risky but may have limitations in measurement range. For example, conventional instruments typically measure up to 250 A, but local 10kV bus systems can exceed 300 A, leading to errors over 15% if the instrument is not designed for high-capacitance systems.

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Test Objectives

The primary goal of capacitive current testing is to: Evaluate the dielectric strength of the bus insulation. Detect abnormal capacitance currents that may indicate insulation degradation or system faults. Ensure that switchgear and circuit breakers can safely interrupt capacitive currents without excessive transient recovery voltage (TRV) stress.

Data Interpretation

Test results typically include: Magnitude of capacitive current: High currents may indicate excessive bus capacitance or insulation issues. Phase angle between voltage and current: Deviations from expected values can reveal insulation asymmetry or partial discharge activity. Trend analysis: Repeated measurements over time help identify gradual insulation deterioration.

Safety and Accuracy Considerations

Using open-delta voltage transformer connections and air-core coils reduces the risk to personnel. Measurement signals at non-power frequencies prevent interference from the system voltage, improving precision. Large-scale systems may require specialized high-range instruments to capture the full capacitive current without exceeding device limits.

Summary10k

V bus capacitive current tests are essential for monitoring the health of medium-voltage distribution systems. Accurate measurement requires careful selection of test methods, consideration of system capacitance, and attention to safety. Both direct and indirect methods are used, with direct methods providing higher accuracy but requiring more sophisticated setups.

Test results inform maintenance decisions, insulation diagnostics, and the safe operation of switchgear and circuit breakers.

Article Content

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The invention discloses a 10kV bus capacitor current monitoring method, which adopts a voltage transformer connected to a power grid in an open delta connection method to realize the input...

Diagnostic measurements on instrument transformers

Here, the test instrument utilizes low voltage and current signals, compared to the nominal values, and calculates the accuracy of current transformers (CTs) and voltage transformers (VTs), which has a

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Improved Testing Method Using the Multi-Transformers Synthetic

To perform a capacitive current switching test (CCT) at AC extra-high-voltage (EHV) and above level, this paper proposes a new multi-transformer synthetic circuit (MTSC) test method that

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Based on the new test method, a simulation test platform was built to test 2 sets of turns-regulating arc suppression coil devices. The results show that the new test method has great application value.

Research on DC Bus Capacitance Health Status by Capacitance

In PV inverter failures, more than half of the faults occur on the bus capacitor, and its capacity drop will increase the harmonic output, and the complete failure state will cause the power

Electrical Testing and Commissioning Handbook | EEP

This handbook offers instructions for testing electrical systems according to National grid standards. Presumably, the extensive and thorough individual testing of the equipment has finished

An On-Line Measurement Method of Capacitance Current in

This paper proposes a method of online measurement of capacitive current in resonant-earthed distribution networks based on injected signals to address the issues caused by inaccurate

Analysis of 10 kV SiC MOSFET Module Baseplate Parasitic

It becomes an increasing concern especially for emerging 10 kV SiC MOSFET modules due to their high voltage and fast switching speed. This paper presents an in-depth analysis of 10 kV SiC MOSFET

Selecting Electrolitic Bus Capacitor for Universal Input

Use your favorite circuit simulator and the model presented in figure 2 to extract the maximum Cbus low frequency current (Ilf), which occurs at the maximum output power and minimum input voltage.

Medium Voltage technical guide

Basics for MV cubicle design This guide is a catalogue of technical know-how intended for medium voltage equipment designers.

Guide for Application of Power Apparatus Bushings.doc

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Bushing capacitance should be measured with each power or dissipation factor test and compared carefully with both nameplate and previous tests in assessing bushing condition. This is especially

Effect of capacitive current on reverse recovery of body diode of 10kV ...

Test results show that when compared with the body diode, the SBD has an extremely low reverse recovery current, a lower capacitive current, and better reverse recovery temperature stability.

Measurement of insulation resistance (IR) – Part 2

Insulation resistance tests are made to determine insulation resistance from individual windings to ground or between individual windings.

A Study to Resist Conduced Interference from GIS Bus-Charging Currents ...

In this paper, we study the conducted interference to an electronic current transformer introduced in the process of bus-charging currents which are caused by switching a gas insulated

Diagnostic measurements on instrument transformers

This stray capacitance, which is the capacitance of the high-voltage side to ground, has to be mathematically considered as, otherwise, a capacitive current is measured rather than an inductive

Setup and preliminary results of a Pilot On-line cable PD monitoring ...

If high sensitivity and high bandwidth are required, then capacitive couplers need to be employed since high frequency current transformers exhibit a limitation concerning bandwidth and gain.

Diagnostic testing of bushings

Because the test covers a wide range of frequencies and uses low currents, electrical noise can adversely affect the accuracy of the measurements,

(PDF) Test circuit for verifying dielectric performance of phase-to ...

This paper illustrates the testing methods and simulation results for the single phase test circuits of capacitive current breaking, applicable to the circuit-breakers from 145 to 362 kV.

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