Shunt capacitor reactor selection

What is a shunt reactor?

Shunt reactors are widely deployed as effective compensation means against the capacitive behavior of high voltage transmission lines. Subsequent to load rejection or light load conditions,a resonance phenomenon is highly potent due to remarkable capacitive feature of these lines.

What is the difference between a shunt reactor and a supply side voltage?

The difference between the reactor and supply side voltages is called the Transient Recovery Voltage(TRV). Both sides of the switch start at the crest voltage of the power system,but due to the high frequency of the Shunt reactor,its voltage rapidly departs from the system voltage creating a steep and high magnitude TRV.

What is the difference between a shunt reactor and a series reactor?

Shunt reactors,primarily switched in during periods of low demand,provide the necessary compensation by absorbing the excess reactive power. The main function of shunt reactor is reactive power compensation. Series reactors on the other hand are used to limit short-circuit currents and manage power flow.

How much current does a shunt reactor carry?

Shunt reactors carry small currents,typically 300 A or less. It is relatively easy to interrupt small currents at first. When the current extinguishes,the shunt reactor voltage oscillates toward zero at the reactor natural frequency,typically 1 to 5 kHz. The supply side varies at 60 Hz power frequency.

Why is a shunt reactor used in a transmission line?

One of the common cases which raise the probability of the resonance phenomenon in the grid is a double-circuit line compensated with a shunt reactor. Shunt reactors are usually used on high voltage transmission lines to limit overvoltagesduring the line energization,load rejection,and under light load conditions.

Why does a shunt reactor have a high voltage?

This voltage rise is caused on lines by Ferranti rise1 and capacitive rise2 when they are lightly loaded3. For this reason,shunt reactors are normally connected to the line (not the bus). Ferranti rise is an effect where a lightly loaded transmission line has a higher voltage at the distant end than the source end.

Shunt capacitors are used to compensate lagging power factor loads, whereas reactors are used on circuits that generate VArs such as lightly loaded cables. The effect of these shunt devices is to supply or absorb the requisite reactive ...

Air core reactors in applications for shunt capacitor banks are often referred to as "capacitor reactor", "inrush/outrush reactor", "transient limiting inductor (TLI)", "damping reactor", or ...

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different reactor types currently used, their characteristics, CT selection and performance issues, and different types of reactor faults. The paper also provides guidelines to practicing engineers to evaluate reactor protection design and determine protection elements and relay settings for a high-voltage transmission line shunt reactor. The ...

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Key learnings: Shunt Reactor Definition: A shunt reactor is defined as an electrical device used in high voltage power systems to stabilize voltage during load changes.; Voltage Stabilization: It controls dynamic overvoltage and provides capacitive reactive power compensation in systems above 400kV.; Impedance Types: Shunt reactors come in gapped ...

Reactor Circuit Representation o Reactors are represented by series RLC oscillatory circuit with a pre-charged capacitor o The circuit oscillation is underdamped with a high amplitude factor of ...

The antecedent applications of shunt capacitor and shunt inductor as power flow controllers (PFCs) are dated to 1914. The power semiconductors have attracted the improvement of static VAR compensators starting from last half of previous century. Then, the thyristor switched capacitors and reactors are improved to utilize rapid and dynamic response of power ...

In this paper, an overview of the possibly prejudicial phenomena caused by the energization of capacitor banks and shunt reactors is presented and an investigation of the effectiveness of ...

This core is constructed from radially disposed laminated steel discs, separated by gaps filled with an insulating fluid.These gaps help maintain the desired voltage-current characteristic, making this design suitable for higher voltage applications.. Working Principles of Shunt Reactors. The functionality of shunt reactors relies heavily on their core design and the magnetic properties of ...

Shunt capacitors are used to compensate lagging power factor loads, whereas reactors are used on circuits that generate VArs such as lightly loaded cables. The effect of these shunt devices is to supply or absorb the requisite reactive power to maintain the magnitude of the voltage.

Shunt reactors carry small currents, typically 300 A or less. It is relatively easy to interrupt small currents at first. When the current extinguishes, the shunt reactor voltage oscillates toward zero at the reactor natural frequency, typically 1 to 5 kHz. The supply side varies at 60 Hz power frequency. The difference between the reactor and ...

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the capacitor should be selected as below: If the reactance rate of the reactor is 6% or 7%, the rated voltage of the capacitor should be 0.45kV or 0.48kV, if the reactance rate of the reactor is 12% or 14%, the rated voltage of the capacitor should be 0.525kV. Table 1 Capacitor selection and harmonic suppression measures under harmonic environment

Shunt reactors are widely deployed as effective compensation means against the capacitive behavior of high voltage transmission lines. Subsequent to load rejection or light load conditions, a resonance phenomenon is highly potent due to ...

The settings selection of the line current differential relays is discussed in detail. A simple method to calculate charging current compensation settings for line differential protection is described as well. Index Terms -- Line Current Differential Relay, Shunt Reactor, Series Capacitor Bank I. INTRODUCTION A. Application of shunt reactors A shunt reactor is a passive device ...

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