

## Solar Energy South Africa

# Capacitor compensation for off-grid solar power generation



## Overview

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Can a grid interfaced solar PV system provide harmonic compensation?

Shah P, Singh B. Low-voltage ride-through operation of grid interfaced solar PV system enabling harmonic compensation capabilities. IET Renew Power Gener. 2019;14 (12):2100–2113. Gayatri M, Parimi AM, Kumar AP. A review of reactive power compensation techniques in microgrids. Renew Sustain Energy Rev. 2018;81:1030–1036.

Why is reactive power compensation important for solar PV systems?

The solar photovoltaic (PV) systems have gained more attention in renewable energy production due to their cost efficiency and reliability. Typically, reactive power compensation and harmonics elimination are challenging and demanding tasks for improving the efficacy of grid-connected solar PV systems.

Does a photovoltaic system with a supercapacitor reduce grid fluctuation?

In this research study, the photovoltaic system equipped with supercapacitor was investigated in order to increase renewable energy utilisation (self-consumption) and decrease grid fluctuation.

Can a photovoltaic system work with a supercapacitor?

Due to long-term reliability and very-high current in a short-time, they can be used as short term power backup and grid stabilisation device. In this work a photovoltaic system working with a supercapacitor device demonstrates its large potential in self-consumption improvement and in grid stabilisation.

Does a PV system with two supercapacitors affect grid stability?

Already the PV system with two supercapacitors (2x100F) fully supplies the load demand during the day and the impact on the grid stability is smoothing of the energy feeding the grid profile. A larger number of supercapacitors does not influence renewable energy utilisation (directly) by the load.

Can supercapacitors prevent grid system frequency and voltage fluctuations?

Esmaili et al. have analysed energy storage with supercapacitors in order to prevent grid system frequency and voltage fluctuations caused by hardly predictable renewable energy systems. Their results show excellent fluctuation reduction in system output power.

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### **(PDF) Sizing of dc-link capacitor for a grid connected**

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Figure 6 shows a grid connected power conversion system consisting of a PV generator, dc-link capacitor and a voltage source inverter supplying  $V_g(t)$  and  $I_g(t)$  respectively to the grid

### **Reactive Compensation and Voltage Control with PV Generation ...**

Both inverter and capacitor bank controls at PV generating facilities. Reactive compensation and voltage control by PV facilities can extend the life of a utility's existing equipment, reduce the ...



### **Investigating SSO risks of large-scale photovoltaic ...**

Series capacitive compensation is an effective measure for enhancing the PV power transfer capacity of long-distance transmission lines. However, the potential of sub-synchronous oscillation (SSO) in such lines ...



### **CONCEPT PAPER ON THE Assessment of Solar PV (SPV) system for power ...**

factor, only the active power that is imported from the grid would be reduced (to the extent of generation of (SPV). The reactive power drawal from the grid will remain same. With 500 kW ...



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