

SolarTech Power Solutions

MPPT Maximum Power Tracking Water Pump Inverter



Overview

This paper investigates enhancing the efficiency of solar water pumping systems (SWPS) by implementing a Maximum Power Point Tracking technique based on the Bat Metaheuristic Optimizer (MPPT-bat) for the photovoltaic generator (PVG) side, coupled with Direct Torque Control (DTC) for the induction motor powering the pump. Can a MPPT-bat improve the efficiency of solar water pumping systems?

Mathematics. 2024;12: 594. This paper investigates enhancing the efficiency of solar water pumping systems (SWPS) by implementing a Maximum Power Point Tracking technique based on the Bat Metaheuristic Optimizer (MPPT-bat) for the photovoltaic generator (PVG) side, coupled with Direct Torque Control (DTC) for the induction motor powering the pump.

What is maximum power point tracking (MPPT)?

In response, various maximum power point tracking (MPPT) techniques are explored to optimize power generation. The study focuses on three MPPT techniques—perturb and observe, incremental conductance, and the beta method—in the context of solar water pump systems.

Can ML-based maximum power point tracking (MPPT) be used in solar power systems?

By performing a thorough analysis of Machine Learning (ML)-based Maximum Power Point Tracking (MPPT) approaches, which are useful for obtaining maximum power in solar power systems, Refs. 27 and 28 add more to the body of research.

What are the different MPPT settings for solar water pump system?

Rotor speed and electromagnetic torque of the solar water pump system under three different MPPT settings: (a) P and O MPPT, (b) IC MPPT, and (c) beta MPPT. In the evaluation of the three MPPT methods [Perturb and Observe (P and O), Incremental Conductance (IC), and beta] for a solar water pump system, the following key findings have been observed:.

What does MPPT stand for?

It consists of an autonomous solar array, an essential DC-DC boosting converter, a three-phase Voltage Source Inverter (VSI), and an induction motor coupled to a centrifugal pump that circulates water. This combined system functions as the testing ground for three different Maximum Power Point Tracking (MPPT) techniques.

Is beta MPPT a good choice for solar water pump system?

The beta MPPT method not only achieves the desired operating points efficiently but also contributes to a more stable and reliable operation of the solar water pump system. In summary, the beta MPPT method is suggested as the most suitable choice for optimizing the performance of the solar water pump system.

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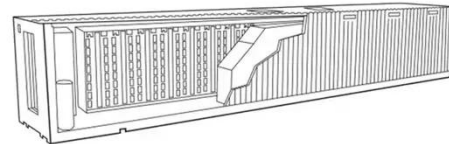


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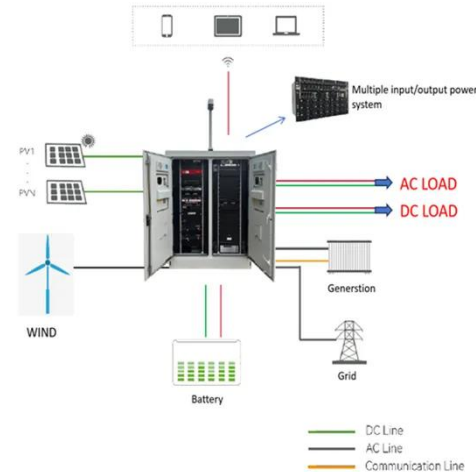
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