

# Solar bidirectional water pump

Can a grid interactive solar photovoltaic (PV)-fed water pumping system have bidirectional power flow control?

Abstract: This paper proposes bidirectional power flow control of a grid interactive solar photovoltaic (PV)-fed water pumping system. A brushless DC (BLDC) motor drive without phase current sensors is used to run a water pump.

Can induction motor drive power solar water pumping system?

Abstract: This paper presents a smart solar water pumping system with the grid interactive features using an induction motor drive. To alleviate the burden on the electrical grid, solar PVs (SPV) can be used to power up the agricultural and irrigational loads.

What is solar water pumping system (SWPS)?

These needs are presently satisfied using diesel generator-based electricity generation [ , ]. In recent times, the solar water pumping system (SWPS) is becoming popular over conventional diesel engine-based pumping systems because of its advantages like fuel-free, maintenance-free, and eco-friendly [ , ].

What is a battery-assisted solar water pumping system (SWPS)?

To support both needs, this study presents the development of a multipurpose battery-assisted solar water pumping system (SWPS). The system consists of only two power electronics converter, viz., bidirectional DC-DC converter, and three-phase voltage source inverter (VSI).

How does a solar water pump work?

A pumping system operated by a solar power-fed synchronous motor is also equipped with a two-stage energy conversion system 36. The PV is paired with a boost converter to increase output, which is optimized using the incremental conductance method. A PMSM-driven water pump with field-oriented control is also shown in 37.

What are the disadvantages of a solar powered water pumping system?

Inconsistency and nonlinear output characteristics in precise under shady conditions are the main flaws in solar-powered motor drives. Additionally, a lack of light (often at night) prevents the pumping unit from operating. For a PV-fed water pumping system to operate continuously and effectively, these restrictions must be shorted out 13.

Abstract This work deals with the development of an efficient and reliable solar photovoltaic-fed water pump with a battery energy storage (BES). This system ensures a ...

When considering the true cost of a solar water pump, it can be helpful to compare to other water pumps, as solar water pumps can be the cheapest option. It is also important to consider your land's needs, how long you



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expect your pump to last, and how you plan to use it to get the most appropriate solar water pump for you. 4  
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This study delves into the optimization of grid-connected solar water pumps by introducing a reduced topology, aiming to enhance both efficiency and cost-effectiveness. The ...

To use this system, people need to have proper solar metering energy set up consisting of a solar panel, solar inverter, bidirectional meter, and an electricity connection. Since there is an absence of a battery for power storage, an electricity connection is essential to transfer the unused energy to the grid.

In this study, a novel water pumping module fed by grid interactive Photo-Voltaic with a bidirectional Power Flow Control was proposed. In addition to improving the pumping ...

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A solar water pump is a type of pump that is driven by the electricity produced from solar panels. Solar pumps are manufactured to supply an eco-friendly and less expensive solution to pumping water in areas where there is no access to ...

The difference, compared with reversible pumps, is that the installed pump can turn only in one direction. The displacement of the reversible pumps varies between 0.16 cm<sup>3</sup>/rev and 86.87 cm<sup>3</sup>/rev, the rotation speed reaches up to 9000 rpm, the maximum pressures reach 320 bar. Depending on the type, our reversible pumps can have: Integrated ...

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pump. The DC bus voltage is selected as 400 V. The electrical specifications of the individual solar module and the designed array are given in Table 1. A centrifugal pump is coupled to the shaft of the submersible induction motor for water pumping. The pump constant is derived using the affinity law of pumps [28] as

$K_{\text{pump}} = T_e \cdot \eta = 14.69 \cdot 149.73$

ible in addition to an enhanced reliability of the pumping system. single phase voltage source converter (VSC) with a unit vector template (UVT) generation technique ...

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Solar-based water pumping has enhanced the feasibility of pumping application since water pumping is an essential operation in agriculture. A solar photovoltaic (PV) water pumping system having two stages with a grid interaction is presented in this article. ... a grid can be integrated through a bidirectional topology capable of feeding the ...

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This article introduces an innovative methodology for enhancing bidirectional power flow control within grid-connected solar photovoltaic (PV)-fed water pumping systems. The proposed system integrates a brushless DC (BLDC) motor drive, presenting a departure from conventional water pump operations that typically require phase current sensors. This departure contributes to an ...

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Also, comparison of water-pumping system with and without maximum power point tracking (MPPT), motor and pumps selection based on water flow rate, optimal converter selection, and effective ...

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Pump hydro energy storage (PHES) is ideal for solar, wind, etc. Brushless DC (BLDC) machine will boost PHES system efficiency. In this study, a bidirectional DC-DC converter (BDDC) interfaces the DC bus and the bidirectional BLDC (BBLDC) machine. ... BDDC can supply DC bus power to the BLDC motor to pump

water to the upper reservoir. It also ...

This paper deals with a brushless DC (BLDC) motor driven water pump powered by a solar photovoltaic (SPV) array and a battery storage. The SPV-battery based hybrid generation is ...

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To support both needs, this study presents the development of a multipurpose battery-assisted solar water pumping system (SWPS). The system consists of only two power electronics converter, viz., bidirectional DC-DC ...

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