

Desain Wadah *Plug-In* Seri Paralel Dan Monitor Kinerja Baterai *Pack*LiFePO₄ Sebagai Penyimpanan Daya Solar Panel

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INTISARI

Perkembangan energi terbarukan, khususnya tenaga surya, mendorong kebutuhan akan sistem penyimpanan energi yang efisien dan aman. Baterai Lithium Iron Phosphate (LiFePO) menjadi salah satu pilihan utama karena memiliki karakteristik stabil, umur pakai panjang, dan aman terhadap suhu tinggi. Penelitian ini bertujuan untuk merancang wadah baterai dan sistem monitoring kinerja baterai LiFePO sebagai penyimpanan daya dari panel surya. Desain wadah mempertimbangkan aspek termal, keamanan, dan kepraktisan instalasi, sedangkan sistem monitoring dibangun menggunakan mikrokontroler ESP32 yang terintegrasi dengan sensor arus ACS712, sensor tegangan, dan sensor suhu DS18B20 untuk mengukur parameter penting baterai. Pengujian dilakukan untuk menilai kinerja akurasi sistem monitoring, kinerja baterai pada kondisi pengisian dan pengosongan, sistem hubung plug-in seri paralel menggunakan konektor XT60, serta pengaruh penggunaan kipas pada wadah di suhu luar ruangan. Hasil menunjukkan sistem monitoring memiliki error sensor arus 13,64%, eror sensor tegangan 1,01%, dan eror sensor suhu 4,92%. Keandalan sistem hubung plugin seri paralel menggunakan konektor XT60 dinilai baik dan bekerja. kipas pendingin yang digunakan memiliki nilai penggunaan yang baik untuk menjaga suhu baterai didalam wadah pada kondisi suhu luar ruangan.

Kata kunci: Lifepo₄, Baterai, Monitoring

*Box Design Of Series Paralel Plugin And Monitoring Of
LiFePO₄ Battery Performance As Solar Panel Power
System*

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ABSTRACT

The development of renewable energy, especially solar power, drives the need for efficient and safe energy storage systems. Lithium Iron Phosphate (LiFePO) batteries are one of the main choices because they have stable characteristics, long service life, and are safe against high temperatures. This study aims to design a battery box and a LiFePO battery performance monitoring system as a power storage from solar panels. The container design considers thermal aspects, safety, and practicality of installation, while the monitoring system is built using an ESP32 microcontroller integrated with an ACS712 current sensor, a voltage sensor, and a DS18B20 temperature sensor to measure important battery parameters. Tests were conducted to assess the performance of the monitoring system accuracy, battery performance under charging and discharging conditions, a series-parallel plug-in connection system using an XT60 connector, and the effect of using a fan on the box at outdoor temperatures. The results show that the monitoring system has a current sensor error of 13.64%, a voltage sensor error of 1.01%, and a temperature sensor error of 4.92%. The reliability of the series-parallel plug-in connection system using XT60 connectors is considered good and works well. The cooling fan used has good usability for maintaining the battery temperature inside the box at outdoor temperatures.

Keywords: Lifepo4, Battery, Monitoring