

ABSTRAK
ANALISIS KINERJA *SOLAR CHARGE CONTROLLER*
PADA SISTEM PEMBANGKIT LISTRIK TENAGA SURYA *OFF-GRID*
DAN *HYBRID*

(2026: xv + 61 Halaman + 17 Daftar Gambar + 8 Daftar Tabel + Lampiran)

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JURUSAN TEKNIK ELEKTRO

PROGRAM STUDI DIII TEKNIK LISTRIK

POLITEKNIK NEGERI SRIWIJAYA

Pembangkit Listrik Tenaga Surya (PLTS) merupakan salah satu sumber energi terbarukan yang memanfaatkan energi matahari untuk menghasilkan energi listrik. Solar Charge Controller (SCC) berperan penting dalam mengatur proses pengisian baterai agar terhindar dari overcharge dan overdischarge. Penelitian ini bertujuan untuk mengetahui prinsip kerja Solar Charge Controller pada sistem PLTS Off-Grid dan Hybrid serta menganalisis nilai efisiensi SCC pada kedua sistem tersebut. Metode penelitian yang digunakan adalah metode kuantitatif deskriptif melalui pengukuran tegangan dan arus pada sisi input dan output SCC. Data hasil pengukuran digunakan untuk menghitung daya input, daya output, dan efisiensi SCC. Hasil penelitian menunjukkan bahwa efisiensi SCC pada sistem Off-Grid memiliki nilai minimum 52,00%, maksimum 80,28%, dan rata-rata 66,46%. Sementara itu, pada sistem Hybrid diperoleh efisiensi minimum 60,00%, maksimum 82,98%, dan rata-rata 75,52%. Hasil tersebut menunjukkan bahwa sistem Hybrid memiliki kinerja SCC yang lebih baik dibandingkan sistem Off-Grid karena didukung oleh lebih dari satu sumber energi sehingga daya masukan lebih stabil.

Kata Kunci: PLTS, Solar Charge Controller, Efisiensi, Off-Grid, Hybrid.

ABSTRACT

SOLAR CHARGE CONTROLLER PERFORMANCE ANALYSIS IN OFF-GRID AND HYBRID SOLAR POWER GENERATION SYSTEMS

(2026: xv + 61 Pages + 17 List of Figures + 8 List of Tables + Attachment)

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Solar Power Plants (SPP) are one of the renewable energy technologies that utilize solar energy to generate electrical power. A Solar Charge Controller (SCC) plays an important role in regulating the battery charging process to prevent overcharging and overdischarging. This study aims to determine the working principle of the Solar Charge Controller in Off-Grid and Hybrid solar power systems and to analyze the SCC efficiency in both systems. The research employed a descriptive quantitative method by measuring voltage and current at the input and output sides of the SCC. The collected data were used to calculate input power, output power, and SCC efficiency. The results show that the SCC efficiency in the Off-Grid system had a minimum value of 52.00%, a maximum value of 80.28%, and an average value of 66.46%. Meanwhile, the Hybrid system achieved a minimum efficiency of 60.00%, a maximum efficiency of 82.98%, and an average efficiency of 75.52%. These results indicate that the Hybrid system provides better SCC performance than the Off-Grid system because it is supported by more than one energy source, resulting in a more stable power input.

Keywords: Solar Power Plant, Solar Charge Controller, Efficiency, Off-Grid, Hybrid.