

ABSTRAK

Rancang Bangun Sistem Catu Daya Tenaga Surya Pada Sistem Hidroponik – Otomatis

(2026: 70 Halaman: 28 Gambar: 6 Tabel + Daftar Pustaka + Lampiran)

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Sistem hidroponik otomatis membutuhkan sumber energi listrik yang stabil untuk mengoperasikan berbagai komponen seperti mikrokontroler, sensor, dan pompa air. Penelitian ini bertujuan untuk merancang dan membangun sistem catu daya tenaga surya pada sistem hidroponik otomatis menggunakan panel surya 270 Wp, Solar Charge Controller (SCC), dan baterai Aki 12 V 60 Ah. Metode penelitian meliputi perancangan, perakitan, serta pengujian kinerja sistem melalui pengukuran tegangan, arus, daya, dan kapasitas baterai. Hasil pengujian menunjukkan bahwa kebutuhan energi harian sistem hidroponik otomatis sebesar 947,6 Wh. Panel surya 270 Wp mampu menghasilkan energi yang cukup untuk memenuhi kebutuhan beban sekaligus mengisi baterai sebagai cadangan energi. Baterai Aki 60 Ah juga mampu menjaga operasional sistem saat intensitas cahaya matahari rendah atau pada malam hari. Dengan demikian, sistem catu daya tenaga surya yang dirancang dapat bekerja dengan baik dan menjadi alternatif sumber energi yang efisien serta ramah lingkungan untuk mendukung sistem hidroponik otomatis.

Kata Kunci: Hidroponik Otomatis, PLTS, Sistem Catu Daya, Panel Surya, Baterai Aki

ABSTRACT

Design and Construction of a Solar Power Supply System for an Automatic Hydroponic System

(2026: 70 Pages: 28 Figures: 6 Tables + References + Appendices)

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An automatic hydroponic system requires a stable electrical power source to operate various components such as microcontrollers, sensors, and water pumps. This study aims to design and develop a solar-powered supply system for an automatic hydroponic system using a 270 Wp solar panel, a Solar Charge Controller (SCC), and a 12 V 60 Ah Aki battery. The research method includes system design, hardware assembly, and performance testing through measurements of voltage, current, power, and battery capacity. The test results show that the daily energy requirement of the automatic hydroponic system is 947,6 Wh. The 270 Wp solar panel is capable of generating sufficient energy to supply the load while charging the battery as an energy storage unit. The 60 Ah Aki battery is also able to maintain system operation during low solar irradiation and at night. Therefore, the designed solar power supply system can operate effectively and serves as an efficient and environmentally friendly energy source for supporting automatic hydroponic systems.

Keywords: Automatic Hydroponics, Solar Power Plant (PLTS), Power Supply System, Solar Panel, Aki Battery.