

ABSTRAK

IMPLEMENTASI SISTEM KONTROL *AUTOMATIC TRANSFER SWITCH* 24VDC MENGGUNAKAN METODE THRESHOLD-BASED

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Kebutuhan akan sistem catu daya yang andal menjadi faktor penting dalam menjaga kontinuitas operasi pada sistem telekomunikasi dan industri. Gangguan pada sumber listrik utama dapat menyebabkan terhentinya proses operasional sehingga diperlukan sistem Automatic Transfer Switch (ATS) yang mampu melakukan perpindahan sumber daya secara otomatis. Penelitian ini bertujuan mengimplementasikan sistem kontrol Automatic Transfer Switch (ATS) 24 VDC menggunakan metode threshold-based yang dipadukan dengan komunikasi Modbus RTU untuk meningkatkan keandalan proses kontrol dan komunikasi sistem. Metode penelitian meliputi studi literatur, perancangan perangkat keras dan perangkat lunak, implementasi sistem berbasis mikrokontroler ESP32, serta pengujian terhadap fungsi monitoring, komunikasi, logika kontrol, dan perpindahan sumber daya. Sistem memanfaatkan sensor PZEM-004T dan PZEM-017 untuk memperoleh data parameter kelistrikan yang diproses menggunakan metode threshold-based sebagai dasar pengambilan keputusan perpindahan sumber secara otomatis, sedangkan komunikasi Modbus RTU digunakan untuk pertukaran data monitoring secara real-time. Hasil pengujian menunjukkan bahwa sistem mampu membaca kondisi tegangan dengan baik, mengirimkan data melalui komunikasi Modbus RTU secara stabil, serta melakukan perpindahan sumber daya secara otomatis sesuai nilai ambang yang telah ditentukan. Dengan demikian, implementasi metode threshold-based dan komunikasi Modbus RTU mampu menghasilkan sistem ATS 24 VDC yang sederhana, responsif, dan andal dalam menjaga kontinuitas suplai daya.

Kata Kunci: Automatic Transfer Switch (ATS), ESP32, Modbus RTU, Sistem kontrol, Threshold-based.

ABSTRACT

IMPLEMENTATION OF 24VDC AUTOMATIC TRANSFER SWITCH CONTROL SYSTEM USING THRESHOLD-BASED METHOD

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A reliable power supply system is essential for maintaining the continuity of operations in telecommunication and industrial applications. Interruptions in the primary power source may disrupt system performance and reduce operational reliability. Therefore, an Automatic Transfer Switch (ATS) is required to automatically transfer the load from the primary power source to a backup source whenever a power disturbance occurs. This study aims to implement a 24 VDC Automatic Transfer Switch control system using the threshold-based method integrated with Modbus RTU communication to improve the reliability of ATS control and communication. The research methodology consisted of a literature review, hardware and software design, ESP32-based system implementation, and functional testing of the monitoring, communication, control logic, and automatic transfer mechanisms. The proposed system employs PZEM-004T and PZEM-017 sensors to acquire electrical parameters, which are processed using the threshold-based method to determine switching decisions automatically. Meanwhile, Modbus RTU communication is utilized to transmit monitoring data in real time between system devices. Experimental results demonstrate that the proposed system accurately monitors voltage conditions, provides stable Modbus RTU communication, and performs automatic source transfer according to predefined threshold values. These results indicate that the implemented system offers a simple, responsive, and reliable solution for maintaining power supply continuity in 24 VDC ATS applications.

Keywords: *Automatic Transfer Switch (ATS), ESP32, Modbus RTU, control system, threshold-based.*