

PERFORMANCE ANALYSIS OF UNINTERRUPTIBLE POWER SUPPLY (UPS) IN DATA CENTERS IN MAINTAINING POWER CONTINUITY

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ABSTRACT

Data centers are critical infrastructures that require a stable and continuous power supply. To maintain the continuity of power supply, an Uninterruptible Power Supply (UPS) system is used. This study aims to analyze the performance of UPS in maintaining power continuity in data centers, especially during switching processes due to power outages. The research method used is a case study with technical data collection through the UPS monitoring system, disturbance log analysis, and evaluation of load and battery parameters. The results show that the UPS switching time is 4.458 ms, still below the tolerance limit of IT devices (≤ 10 ms) and has met the IEC 62040-3 standard for online double conversion UPS. The output voltage stability is maintained with a deviation of 0.304%, which is within the tolerance limit of the VFI class. Battery analysis shows that internal resistance affects the voltage drop, where higher resistance causes a greater voltage drop. Battery 1 experienced a voltage drop of 1.217 V with an internal resistance of 11.81 m Ω , while battery 2 only experienced a voltage drop of 0.237 V with a resistance of 1.78 m Ω . Furthermore, battery capacity and load variations were shown to affect backup duration, with increased load decreasing battery remaining time. Overall, the analyzed UPS system was able to maintain data center power continuity in accordance with critical electrical system reliability standards.

Keywords : *Data center, Uninterruptible Power Supply (UPS), Switching, Remain Time*

ANALISIS PERFORMA *UNINTERRUPTIBLE POWER SUPPLY* (UPS) PADA DATA *CENTER* DALAM MENJAGA KONTINUITAS DAYA

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ABSTRAK

Data *center* merupakan infrastruktur kritikal yang memerlukan pasokan daya listrik yang stabil dan berkelanjutan. Untuk menjaga kontinuitas suplai daya, digunakan sistem *Uninterruptible Power Supply* (UPS). Penelitian ini bertujuan untuk menganalisis performa UPS dalam menjaga kontinuitas daya pada data *center*, khususnya saat terjadi proses *switching* akibat gangguan listrik. Metode penelitian yang digunakan adalah studi kasus dengan pengambilan data teknis melalui sistem monitoring UPS, analisis log gangguan, serta evaluasi parameter beban dan baterai. Hasil penelitian menunjukkan bahwa waktu *switching* UPS sebesar 4,458 ms, masih berada di bawah batas toleransi perangkat IT (≤ 10 ms) dan telah memenuhi standar IEC 62040-3 untuk UPS tipe *online double conversion*. Stabilitas tegangan *output* tetap terjaga dengan deviasi sebesar 0,304%, yang berada dalam batas toleransi kelas VFI. Analisis baterai menunjukkan bahwa internal *resistance* berpengaruh terhadap *voltage drop*, di mana resistansi yang lebih tinggi menyebabkan penurunan tegangan lebih besar. Baterai 1 mengalami *voltage drop* sebesar 1,217 V dengan resistansi internal 11,81 m Ω , sedangkan baterai 2 hanya 0,237 V dengan resistansi 1,78 m Ω . Selain itu, kapasitas baterai dan variasi beban terbukti memengaruhi lama waktu *backup*, di mana peningkatan beban menyebabkan penurunan *remain time* baterai. Secara keseluruhan, sistem UPS yang dianalisis mampu menjaga kontinuitas daya data *center* sesuai dengan standar keandalan sistem kelistrikan kritikal.

Kata kunci: *Data center, Uninterruptible Power Supply (UPS), Switching, Remain Time*