

## ABSTRAK

SAFRI DWI KURNIAWATI, 202311641. Analisis Uprating Overload Transformator Gardu Distribusi K-034 PLN UP3 Kotamobagu Dengan Pendekatan Simulasi ETAP.

Dibimbing oleh DESTINA SURYA LESTARI, ST., MT

Penelitian ini bertujuan untuk menganalisis uprating overload Transformator K-034 di PT PLN (Persero) UP3 Kotamobagu dari kapasitas 50 kVA menjadi 100 kVA, yang dilakukan karena berdasarkan hasil pengukuran pada September 2025 transformator tersebut mengalami pembebanan melebihi kapasitas nominal, yaitu sebesar 114,08%, akibat peningkatan jumlah pelanggan. Metode uprating dipilih sebagai solusi karena dinilai paling efisien tanpa memerlukan penambahan lahan maupun material pendukung. Penelitian difokuskan pada analisis pembebanan, drop tegangan ujung saluran, rugi-rugi daya, dan efisiensi transformator, serta didukung dengan simulasi menggunakan perangkat lunak ETAP untuk melihat pengaruh uprating secara sistematis. Hasil perhitungan menunjukkan bahwa sebelum uprating, transformator K-034 menanggung beban sebesar 57,04 kVA dengan persentase pembebanan 114,08%, rugi-rugi daya total sebesar 1,913 kW, efisiensi 95,98%, dan drop tegangan sebesar 4,59%. Setelah dilakukan uprating ke kapasitas 100 kVA, persentase pembebanan menurun menjadi 44,04%, rugi-rugi daya berkurang sebesar 41%, efisiensi meningkat menjadi 96,88%, serta drop tegangan menurun sebesar 2,13%. Hasil simulasi ETAP menunjukkan kondisi yang sejalan, di mana pembebanan transformator sebelum uprating sebesar 117% dengan drop tegangan 2,68%, dan setelah uprating pembebanan menurun menjadi 44,90% dengan drop tegangan sebesar 1,93%.

***Kata Kunci : Transformator distribusi, overload, uprating, gardu distribusi, drop tegangan, ETAP.***

## ***ABSTRACT***

SAFRI DWI KURNIAWATI, 202311641. *Analysis of Overload Uprating of K-034 Distribution Substation Transformer, PLN UP3 Kotamobagu, using ETAP Simulation.*  
*Under the guidance of DESTINA SURYA LESTARI, ST., MT*

*This study aims to analyze the uprating of the K-034 transformer overload at PT PLN (Persero) UP3 Kotamobagu from a capacity of 50 kVA to 100 kVA, which was carried out because based on measurements in September 2025, the transformer experienced a load exceeding its nominal capacity, namely 114.08%, due to an increase in the number of customers. The uprating method was chosen as the solution because it was considered the most efficient without requiring additional land or supporting materials. The research focused on analyzing the load, end-of-line voltage drop, power losses, and transformer efficiency, and was supported by simulations using ETAP software to systematically observe the effects of uprating. The calculation results show that before uprating, the K-034 transformer carried a load of 57.04 kVA with a loading percentage of 114.08%, total power losses of 1.913 kW, efficiency of 95.98%, and a voltage drop of 4.59%. After uprating to a capacity of 100 kVA, the load percentage decreased to 44.04%, power losses were reduced by 41%, efficiency increased to 96.88%, and voltage drop decreased by 2.13%. The ETAP simulation results showed similar conditions, where the transformer loading before uprating was 117% with a voltage drop of 2.68%, and after uprating, the loading decreased to 44.90% with a voltage drop of 1.93%.*

***Keyword: Distribution Transformer, Overload, Uprating, Distribution Station, Voltage Drop, ETAP.***