

ABSTRAK

Lesti Veronika Sirait: Analisis Kinerja Rele Diferensial sebagai Proteksi dari Gangguan Arus Hubung Singkat di Gardu Induk Glugur. Skripsi. Fakultas Teknik Universitas Negeri Medan, 2024.

Circuit breaker (CB) diharapkan dapat segera trip saat terjadi gangguan arus lebih. Rele diferensial adalah peralatan yang berfungsi memerintahkan CB untuk trip. Gangguan pada Trafo Daya 3 Gardu Induk Glugur menyebabkan PMT 150 kV dan 20 kV trip. Gangguan ini diindikasikan berasal dari kegagalan rele diferensial. Penelitian ini bertujuan menganalisis setting rele diferensial pada Gardu Induk Glugur, dan menganalisis simulasi setting rele diferensial Gardu Induk dengan menggunakan software ETAP 12.6.0, dan menganalisis perbandingan hasil simulasi rele diferensial antara data setting Gardu Induk Glugur dengan analisis matematis. Hasil penelitian diperoleh bahwa terdapat perbedaan antara setting rele diferensial aktual dengan perhitungan teoritis, di mana setting aktual menunjukkan arus setting 0,3 A, slope1 = 30%, dan slope2 = 70%, sementara perhitungan teoritis menunjukkan Arus Setting 0,481 A, slope1 = 11,76%, dan slope2 = 23,53%. Hasil simulasi ETAP menunjukkan bahwa pada setting rele aktual Gardu Induk Glugur, saat terjadi gangguan pada sisi 20 kV sebesar 45096 A, CB mengalami trip dengan time delay lebih lama, yaitu CB1 390 ms dan CB2 340 ms. Data analisis teoritis, dengan simulasi menunjukkan CB trip dengan time delay lebih cepat, yaitu CB1 313 ms dan CB2 263 ms. Berdasarkan hasil analisis, setting rele analisis teoritis lebih andal dalam proteksi gangguan arus hubung singkat dibandingkan setting rele aktual di Gardu Induk Glugur.

Kata kunci: *Rele Diferensial, Arus Gangguan, Sistem Proteksi, ETAP.*



ABSTRACT

Lesti Veronika Sirait: *Analysis of Differential Relay Performance as Protection Against Short Circuit Currents in Glugur Substation*. Thesis. Faculty of Engineering, Universitas Negeri Medan, 2024.

The circuit breaker (CB) is expected to trip immediately when an overcurrent fault occurs. The differential relay is a device that functions to command the CB to trip. A fault in the Power Transformer 3 at the Glugur Substation caused the 150 kV and 20 kV circuit breakers to trip. This fault is indicated to originate from the failure of the differential relay. This study aims to analyze the differential relay settings at the Glugur Substation, simulate the differential relay settings using ETAP 12.6.0 software, and compare the simulation results of the differential relay with the mathematical analysis of the Glugur Substation settings. The research results showed a difference between the actual differential relay settings and theoretical calculations, where the actual settings showed a setting current of 0.3 A, slope1 = 30%, and slope2 = 70%, while the theoretical calculation showed a setting current of 0.481 A, slope1 = 11.76%, and slope2 = 23.53%. The ETAP simulation results indicated that with the actual relay settings at the Glugur Substation, during a 20 kV side fault of 45096 A, the CB tripped with a longer time delay, specifically CB1 at 390 ms and CB2 at 340 ms. The theoretical analysis data, using the simulation, showed that the CB tripped with a faster time delay, specifically CB1 at 313 ms and CB2 at 263 ms. Based on the analysis results, the theoretical analysis relay settings are more reliable for short-circuit current protection compared to the actual relay settings at the Glugur Substation.

Keywords: Differential Relay, Fault Current, Protection System, ETAP

