

RINGKASAN

ANALISIS KOORDINASI SISTEM PROTEKSI OVER CURRENT RELAY (OCR), GROUND FAULT RELAY (GFR) DAN RECLOSER PADA PENYULANG DOMBA GARUT (DOGA) 20KV GARDU INDUK GARUT DI PT. PLN (PERSERO) UP2D JAWA BARAT

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Peningkatan kebutuhan energi listrik menuntut sistem distribusi tenaga listrik yang andal, aman, dan berkesinambungan, karena gangguan seperti arus lebih dan hubung singkat dapat menyebabkan kerusakan peralatan serta pemadaman listrik apabila tidak ditangani dengan baik, sehingga diperlukan sistem proteksi yang mampu bekerja secara cepat, selektif, dan terkoordinasi menggunakan perangkat seperti Over Current Relay (OCR), Ground Fault Relay (GFR), dan recloser. Penelitian ini bertujuan menganalisis koordinasi sistem proteksi OCR, GFR, dan recloser pada Penyulang Domba Garut (DOGA) 20 kV di Gardu Induk Garut PT PLN (Persero) UP2D Jawa Barat dengan menggunakan simulasi perangkat lunak ETAP 21.0.1 melalui pengumpulan data teknis penyulang, evaluasi setting proteksi eksisting, serta perhitungan dan simulasi gangguan arus hubung singkat tiga fasa dan satu fasa ke tanah. Hasil perhitungan menunjukkan bahwa arus hubung singkat maksimum pada kondisi tiga fasa di dekat sumber (0% panjang penyulang) sebesar $\pm 17,98$ kA, sedangkan arus gangguan satu fasa ke tanah di ujung penyulang (100%) sebesar $\pm 2,66$ kA, yang kemudian digunakan sebagai dasar penentuan nilai arus pickup dan Time Multiplier Setting (TMS). Berdasarkan hasil simulasi koordinasi proteksi, recloser bekerja sebagai proteksi utama pada zona hilir dengan waktu operasi lebih cepat, sedangkan OCR dan GFR berfungsi sebagai proteksi cadangan di sisi hulu dengan selisih waktu kerja (grading time) minimal 0,3 detik sesuai standar PLN, sehingga penyetelan ulang nilai arus pickup dan TMS mampu meningkatkan selektivitas, kecepatan, dan keandalan sistem proteksi dalam menjaga kontinuitas penyaluran tenaga listrik.

Kata kunci : *Over Current Relay (OCR), Ground Fault Relay (GFR), Recloser, ETAP, Koordinasi Proteksi.*

SUMMARY

ANALYSIS OF COORDINATION OF OVER CURRENT RELAY (OCR), GROUND FAULT RELAY (GFR) AND RECLOSER PROTECTION SYSTEMS IN DOMBA GARUT (DOGA) 20KV FEEDER AT GARUT SUBSTATION AT PT. PLN (PERSERO) UP2D WEST JAVA

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The increasing demand for electrical energy requires a power distribution system that is reliable, safe, and sustainable, as disturbances such as overcurrent and short-circuit faults can cause equipment damage and power outages if not properly handled; therefore, a protection system that operates quickly, selectively, and in a coordinated manner is required, utilizing devices such as Over Current Relay (OCR), Ground Fault Relay (GFR), and reclosers. This study aims to analyze the coordination of OCR, GFR, and recloser protection systems on the Domba Garut (DOGA) 20 kV feeder at the Garut Substation of PT PLN (Persero) UP2D West Java by using simulations with ETAP 21.0.1 software through the collection of feeder technical data, evaluation of existing protection settings, and calculation and simulation of three-phase and single line-to-ground short-circuit faults. The calculation results show that the maximum three-phase short-circuit current near the source (0% of feeder length) is approximately ± 17.98 kA, while the single line-to-ground fault current at the end of the feeder (100% of feeder length) is approximately ± 2.66 kA, which are then used as the basis for determining pickup current values and Time Multiplier Setting (TMS). Based on the protection coordination simulation results, the recloser operates as the main protection device in the downstream zone with a faster operating time, while OCR and GFR function as backup protection devices on the upstream side with a minimum grading time of 0.3 seconds in accordance with PLN standards, indicating that resetting the pickup current and TMS values improves the selectivity, speed, and reliability of the protection system in maintaining the continuity of power distribution.

Keywords : Over Current Relay (OCR), Ground Fault Relay (GFR), Recloser,
ETAP, Protection Coordination