ABSTRAK

Sistem proteksi dalam sistem tenaga listrik berfungsi untuk mendeteksi dan melokalisir gangguan guna menjaga keandalan sistem. *Overcurrent relay* dan *ground fault relay* merupakan bagian penting dari perangkat proteksi yang memerlukan *setting* sesuai rasio *current transformer*. Di Gardu Induk UjungBerung, dilakukan *uprating current transformer* dari tiga inti menjadi lima inti untuk meningkatkan akurasi dan keandalan sistem proteksi, serta *current transformer* yang digunakan telah berumur lebih dari 30 tahun. Perubahan ini memerlukan *resetting* nilai *setting* arus pada *relay* agar sesuai dengan konfigurasi *current transformer* yang baru. Penelitian ini bertujuan untuk menghitung ulang nilai *setting* arus *overcurrent relay* dan *ground fault relay* pada *interbus transformer* 150/70 kV pasca *uprating current transformer* dan melakukan simulasi sistem proteksi menggunakan *software* ETAP 19.0.1. Metode yang digunakan meliputi studi literatur, pengumpulan data dari PT. PLN Gardu Induk UjungBerung, perhitungan manual berdasarkan standar PLN dan IEC 60255, serta simulasi gangguan tiga fasa dan fasa ke tanah dengan ETAP. Hasil simulasi ETAP menunjukkan waktu *respons overcurrent relay* pada gangguan tiga fasa 70 kV adalah 1069 ms dan pada 150 kV adalah 2002 ms, sedangkan waktu *respons ground fault relay* pada 70 kV adalah 1179 ms dan pada 150 kV adalah 1929 ms, semua dalam batas toleransi ±10% dari standar 1 detik. Kurva koordinasi *Time Current Characteristic* menunjukkan bahwa tidak ada *relay* yang bersinggungan antara sisi 150 kV dan 70 kV. Penelitian menyimpulkan bahwa nilai *setting* ulang *relay* sudah memenuhi standar proteksi PLN dan IEC 60255 serta dapat dijadikan referensi untuk penerapan sistem proteksi di Gardu Induk UjungBerung.

Kata kunci: Sistem Proteksi, *Overcurrent Relay, Ground Fault Relay, Uprating, Current Transformer, Software* ETAP.

ABSTRACT

The protection system in the electrical power grid is essential for detecting and isolating faults to ensure system reliability. Overcurrent relays and ground fault relays are crucial components that require settings based on the current transformer ratio. At the UjungBerung Substation, the current transformer was upgraded from three cores to five cores to improve the protection system's accuracy, as the existing transformer had been in operation for over 30 years. This upgrade required resetting the relay settings to match the new current transformer configuration. This study aims to recalculate the current setting values for the overcurrent relay and ground fault relay on the 150/70 kV interbus transformer after the upgrade and simulate the protection system using ETAP 19.0.1 software. The methodology includes a literature review, data collection from the state-owned electricity company UjungBerung Substation, manual calculations based on relevant standards, and fault simulations for three-phase and ground faults using ETAP. The simulation results show that the overcurrent relay response time for a three-phase fault at 70 kV is 1069 ms and at 150 kV is 2002 ms, while the ground fault relay response time for 70 kV is 1179 ms and for 150 kV is 1929 ms, all within the tolerance limits of ±10% from the 1-second standard. The Time Current Characteristic coordination curve indicates no overlap between relays on the 150 kV and 70 kV sides. The study concludes that the reset relay settings comply with the protection standards of the state-owned electricity company and international standards, serving as a reference for future applications at UjungBerung Substation.

Keyword: Protection System, Overcurrent Relay, Ground Fault Relay, Uprating, Current Transformer, ETAP Software