

RINGKASAN

ANALISIS KOORDINASI SISTEM PROTEKSI *OVER CURRENT RELAY*, *GROUND FAULT RELAY*, DAN *RECLOSER* PADA PENYULANG KBL 13 DI GARDU INDUK 150 KV KALIBAKAL PT. PLN (PERSERO) UP3 PURWOKERTO

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Pada tahun 2019 penyulang KBL 13 telah mengalami *trip* (pemadaman) sebanyak 5 kali akibat gangguan hubung singkat. Hal tersebut mengindikasikan bahwa koordinasi *relay* proteksi pada PMT *outgoing* dan *recloser* tersebut belum sesuai standar PLN. Koordinasi *relay* proteksi adalah waktu kerja OCR dan GFR serta selisih waktu kerja OCR dan GFR di tiap peralatan proteksi. Untuk mengetahui koordinasi *relay* yang tepat, dibutuhkan perhitungan arus nominal trafo, reaktansi sumber, reaktansi trafo, impedansi serta arus hubung singkatnya. Dalam penelitian ini, didapat perhitungan arus hubung singkat terbesar 10128,95 A dan terkecil 1507,442 A. Perhitungan arus hubung singkat digunakan untuk menghitung waktu kerja OCR/GFR serta mengetahui selisih waktu kerja (Δt) *relay* antara PMT *outgoing* dan *recloser*. Pada perhitungan awal waktu kerja OCR/GFR didapat Δt *relay* yang belum sesuai standar PLN. Berdasarkan standar PLN untuk Δt *relay* antara PMT *outgoing* dan *recloser* sebesar 0,4 detik dan Δt *relay* antar *recloser* sebesar 0,1 detik. Sehingga diperlukan pengaturan ulang nilai tms (*time multiple setting*) untuk memperoleh Δt *relay* sesuai standar PLN. Berdasarkan hasil perhitungan untuk nilai tms OCR baru pada PMT *outgoing* sebesar 0,30 detik, *recloser* I 0,12 detik, dan *recloser* II 0,08 detik. Sedangkan tms GFR baru pada PMT *outgoing* 0,29 detik, *recloser* I 0,12 detik, dan *recloser* II 0,08 detik. Perubahan pada nilai tms tersebut menghasilkan Δt kerja *relay* pada PMT *outgoing* dan *recloser* sebesar 0,4 detik dan antar *recloser* sebesar 0,1 detik sehingga sesuai dengan standar PLN.

Kata kunci : arus hubung singkat, koordinasi *relay*, tms (*time multiple setting*)

SUMMARY

ANALYSIS OF PROTECTION SYSTEM COORDINATION OVER CURRENT RELAY, GROUND FAULT RELAY, AND RECLOSER FOR KBL 13 FEEDER ON KALIBAKAL SUBSTATION PT. PLN (PERSERO) UP3 PURWOKERTO

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In 2019 the KBL 13 feeders experienced 5 trips (blackouts) due to short circuit problems. This indicates that the coordination of the protection relays on the outgoing and recloser PMTs is not yet according to PLN standards. Protection relay coordination is the working time of OCR and GFR and the difference in working time of OCR and GFR in each protective equipment. To find the proper relay coordination, it is necessary to calculate the nominal current of the transformer, the reactance of the source, the reactance of the transformer, the impedance and the short circuit current. In this research, the largest short circuit current calculation is 10128.95 A and the smallest is 1507.442 A. The calculation of short circuit current is used to calculate the working time of the OCR / GFR and determine the working time difference (Δt) of the relay between the outgoing PMT and recloser. In the initial calculation of the OCR / GFR working time, it was found that the relay was not yet in accordance with PLN standards. Based on the PLN standard for Δt relay between outgoing PMT and recloser is 0.4 seconds and Δt relay between reclosers is 0.1 second. So it is necessary to reset the tms value (time multiple setting) to obtain Δt relay according to PLN standards. Based on the calculation results for the new OCR tms value for outgoing PMT was 0.30 seconds, recloser I was 0.12 seconds, and recloser II was 0.08 seconds. Meanwhile, the new GFR tms for outgoing PMT was 0.29 seconds, recloser I was 0.12 seconds, and recloser II was 0.08 seconds. The change in the tms value results in a relay working Δt for outgoing and recloser I of 0.4 seconds and between reclosers of 0.1 second so that it is in accordance with PLN standards.

Keywords: electrical power system, short circuit, relay coordination