RANCANG BANGUN SISTEM MONITORING SIX-BRAKE GENERATOR BERBASIS PLC HAIWELL DAN HMI UNTUK DETEKSI DINI GANGGUAN DI PLTA KOTO PANJANG

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ABSTRAK

Pembangkit Listrik Tenaga Air (PLTA) membutuhkan sistem monitoring yang andal untuk menjaga keandalan operasi generator. Penelitian ini bertujuan merancang sistem monitoring *Six-brake* generator berbasis PLC Haiwell dan HMI pada Unit 1 PLTA Koto Panjang untuk mempermudah pemantauan kondisi *brake* secara *real-time*. Metode yang digunakan adalah *design and build* melalui observasi, perancangan *hardware* dan *software*, integrasi, serta pengujian sistem. Sistem memanfaatkan *Limit Switch existing*, *relay*, PLC Haiwell, dan HMI sebagai media pengolahan serta visualisasi data. Hasil pengujian menunjukkan PLC mampu membaca keenam *Limit Switch* dan menampilkan kondisi *brake* pada HMI sesuai kondisi aktual. Sistem berhasil diintegrasikan tanpa mengubah fungsi utama kontrol generator serta meningkatkan kemudahan dan efisiensi pemantauan *brake* oleh operator.

Kata Kunci: *Six-Brake* Generator, PLC Haiwell, *Human Machine Interface*, *Limit Switch*, Sistem Monitoring, PLTA Koto Panjang.

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ABSTRACT

Hydroelectric Power Plants (PLTA) require reliable monitoring systems to maintain generator operation and safety. This study aims to design a Six-brake generator monitoring system based on a Haiwell PLC and HMI *at Unit 1 of Koto Panjang Hydroelectric Power Plant to facilitate real-time brake condition monitoring. The method used was a design and build approach involving system observation, hardware and software design, integration, and testing. The system uses existing Limit Switches, relays, a Haiwell PLC, and an* HMI *for data processing and visualization. The test results show that the PLC successfully detects signals from all six Limit Switches and displays brake conditions on the* HMI *according to actual field conditions. The system was successfully integrated without affecting the generator's main control functions, improving the ease and efficiency of brake monitoring for operators.*

Keywords: Hydroelectric Power Plant, Six-Brake, Haiwell PLC, HMI*, Limit Switch, Real-Time Monitoring, Generator*.