Analisis Sistem Monitoring Dan Kontrol Temperatur Pada ruangan Generator Berbasis *HMI*

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ABSTRAK

Generator merupakan salah satu komponen utama pada pembangkit listrik yang berfungsi mengubah energi mekanik menjadi energi listrik. Temperatur ruangan generator yang tidak terkontrol dapat menyebabkan penurunan kinerja peralatan, mempercepat kerusakan komponen, bahkan mengakibatkan unit trip. Pada Unit 3 PLTA Koto Panjang, pemantauan temperatur ruangan generator sebelumnya masih dilakukan secara manual menggunakan termometer sehingga kurang efektif dalam menjaga kestabilan suhu. Penelitian ini bertujuan untuk merancang, mengimplementasikan, dan menganalisis sistem monitoring dan kontrol temperatur ruangan generator berbasis *Programmable Logic Controller* (PLC) dan *Human Machine Interface* (HMI).

Sistem yang dirancang menggunakan sensor RTD PT100 sebagai pembaca temperatur, PLC Haiwell sebagai pengendali utama, HMI sebagai media pemantauan, serta dua unit *fan blower* sebagai aktuator pendingin. *Fan blower 1* dirancang aktif pada temperatur 37,6℃, sedangkan *fan blower 2* aktif pada temperatur 38,2℃. Metode penelitian yang digunakan meliputi studi literatur, perancangan sistem, implementasi perangkat keras dan perangkat lunak, pengujian fungsional, pengujian keakuratan sensor, pengujian respons PLC, serta analisis hasil implementasi.

Hasil pengujian menunjukkan bahwa seluruh komponen sistem berfungsi dengan baik sesuai rancangan. Sensor RTD PT100 memiliki rata-rata tingkat akurasi sebesar 99,50% dengan nilai error sebesar 0,28%. Pengujian respons PLC menunjukkan bahwa sistem mampu mengaktifkan *fan blower* secara otomatis sesuai *set point* yang telah ditentukan. Komunikasi antara PLC dan HMI berjalan dengan baik tanpa ditemukan gangguan komunikasi. Implementasi sistem mampu menjaga temperatur ruangan generator pada rentang 37°C–39°C selama pengujian berlangsung sehingga proses pemantauan dan pengendalian temperatur dapat dilakukan secara otomatis dan real-time.

Kata Kunci: Generator, PLC, HMI, RTD PT100, Monitoring Temperatur, Kontrol Temperatur, Fan Blower.

ANALYSIS OF TEMPERATURE MONITORING AND CONTROL SYSTEM IN GENERATOR ROOM BASED ON HMI

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ABSTRACT

A generator is one of the main components in a power plant that functions to convert mechanical energy into electrical energy. Uncontrolled generator room temperature can lead to decreased equipment performance, accelerated component deterioration, and even unit trips. At Unit 3 of Koto Panjang Hydroelectric Power Plant (PLTA Koto Panjang), generator room temperature monitoring was previously carried out manually using a thermometer, making it less effective in maintaining temperature stability. This study aims to design, implement, and analyze a generator room temperature monitoring and control system based on a Programmable Logic Controller (PLC) and Human Machine Interface (HMI).

The designed system utilizes an RTD PT100 sensor for temperature measurement, a Haiwell PLC as the main controller, an HMI as the monitoring interface, and two blower fans as cooling actuators. Blower Fan 1 is programmed to operate when the temperature reaches 37.6°C, while Blower Fan 2 is activated when the temperature reaches 38.2°C. The research methods include literature review, system design, hardware and software implementation, functional testing, sensor accuracy testing, PLC response testing, and implementation result analysis.

The test results indicate that all system components functioned properly according to the design. The RTD PT100 sensor achieved an average accuracy rate of 99.50% with an error value of 0.28%. The PLC response test showed that the system was capable of automatically activating the blower fans according to the predetermined set points. Communication between the PLC and HMI operated properly without any communication disturbances. The implementation of the system was able to maintain the generator room temperature within the range of 37°C–39°C during the testing period, enabling the temperature monitoring and control process to be carried out automatically and in real time.

Keywords: *Generator, PLC, HMI, RTD PT100, Temperature Monitoring, Temperature Control, Blower Fan.*