Intisari

Penggunaan listrik dalam jumlah besar berperan dalam meningkatkan kadar gas CO_2 yakni melalui hasil emisi pembakaran dari pembangkitan listrik berbahan bakar fosil. Gas CO_2 merupakan salah satu penyebab pemanasan global. Sebagian besar bangunan menggunaan energi untuk sistem pencahayaan. Untuk menguranginya, maka perlu dilakukan studi berkelanjutan pada sistem pencahayaan dalam upaya penghematan listrik.

Sistem pencahayaan gedung saat ini didominasi oleh penggunaan lampu jenis *fluorescent* (TL *Fluorescent*) dan *solid state lighting* (LED). Dalam upaya penghematan energi maka dilakukan penelitian tentang perbandingan penggunaan energi dan *electric power quality* (EPQ) pada *fluorescent tube lamp* (TL *Fluorescent*) 36 Watt menggunakan ballast magnetik dengan retrofitnya *light emitting diodes tube lamp* (TL LED) 18 Watt. EPQ yang dibandingkan yakni nilai faktor daya, nilai *total harmonic distortion of voltage* (THD_V) dan nilai *total harmonic distortion of current* (THD_I). Suatu *green technology* pada pencahayaan, selain aspek efisiensi penggunaan energi dan tingkat efikasi lampu, aspek kualitas daya listrik pun harus dipertimbangkan demi keamanan pada sistem listrik.

Menurut hasil pengujian TL *Fluorescent* 36 Watt dan TL LED 18 Watt menunjukkan bahwa konsumsi daya lebih rendah pada TL LED (756,2 Watt) dibandingkan TL *Fluorescent* (858 Watt). Namun TL LED memiliki kekurangan lebih tingginya nilai THD_I (38%) dibandingkan THD_I TL *Fluorescent* (12%).

Kata kunci : Energi, TL LED, TL *Fluorescent*, Harmonik.

Abstract

Using large amounts of electricity plays a role in increasing the levels of CO_2 gas through combustion emissions result from fossil fuel power generation. CO_2 gas is one of the global warming causes. Most of the buildings use energy for lighting system. Thus, research on the lighting system should be done furthermore as an effort to save the electricity.

Nowadays, building lighting system is dominated by a type of fluorescent lamp (TL Fluorescent) and solid state lighting (LED). Attempting energy efficiency makes this study compares the energy used and electric power quality (EPQ) between 36 Watt fluorescent tube lamp (TL Fluorescent) using magnetic ballast and 18 Watt light emitting diodes tube lamp (TL LED). EPQ comparation are the value of power factor, total harmonic distortion of voltage (THD_V) and total harmonic distortion of current (THD_I). A green technology for the lighting, beside of lamp energy efficiency and efficacy level, power quality aspect is also must be taken into consideration for the safety of the electrical system.

The test results of 36 Watt TL Fluorescent and 18 Watt TL LED indicates that power consumption of LED (756,2 Watt) is more efficient compared to TL Fluorescent (858 Watt) but TL LED THD_I value (38%) is higher than TL Fluorescent THD_I value (12%).

Keywords : Energy, TL LED, TL Fluorescent, Harmonic.