Implementation of energy saving controller for electromagnetic ballast fluorescent lamps

Abstract

Fluorescent lamps have proven to be the most efficient lighting device. However, energy losses have been found in electromagnetic ballast due to high harmonic distortion and low power factor so energy is consumed unnecessarily. In today's energy demanding environment, energy efficiency of fluorescent lamps can be improved by introducing an energy saving controller in the electromagnetic ballast. The energy saving controller limits the supply voltage to an optimum level which tends to reduce the power losses in electromagnetic ballasts and fluorescent lamps. It is also anticipated that the energy saving controller has desirable characteristics of high power factor with dimmable illuminance level control. In comparison to electronic dimmable ballast, integration an energy saving controller with electromagnetic ballast fluorescent lamps results in less power consumption, dimmable illuminance control and longer life span at a much lower installation cost. Furthermore, there is no replacement cost for integrating the energy saving controller with existing electromagnetic fluorescent lamps system. In this paper, experimental works have been performed to investigate hardware implementation of the system which further supported by simulation on MATLAB Simulink. Experimental results based on the proposed energy saving controller showed that electromagnetic ballast fluorescent lamps can be dimmed without any problems down to 50% illuminance level output. In addition, experimental results show that 37.5% power consumption can be saved by reducing 15% of the supply voltage.