ACADEMICIA
An International Multidisciplinary Research Journal
(Double Blind Refereed & Peer Reviewed Journal)

DOI: 10.5958/2249-7137.2021.01244.1

APPLICATION AND RESEARCH OF ENERGY-SAVING LIGHTING DEVICES IN ENGINEERING NETWORKS

Obidov J.G*; Ibrohimov J.M**

[1,2]Ferghana Polytechnic Institute,
UZBEKISTAN
Email id: jamshidobidov19@gmail.com

ABSTRACT

This system allows to control the flow of light by adding or subtracting light. Such actions can be performed via a remote control. This system is quite complex, but very convenient. With the help of this system, a special sensor that detects the level of light can be installed and it is possible to provide automatic lighting of lamps at the desired level. The article discusses the support of energy-saving systems in the technical regulation of public utilities, in particular, metrological regulation of ballast effect control.

KEYWORDS: *Light Flux, Acoustic Noise, Acoustic Control System, General Control System, Optical Control System, Functional Circuit, Light Source.*

INTRODUCTION

In today's world of energy, most of the electricity is used for lighting. Based on the facts on the topic, we can say that in most industries, agriculture, national economy, industry and utilities, energy conservation and energy conservation issues have become an urgent problem of modern lighting systems technologies. In 14 countries of the world there are state programs and fundamental projects on energy saving in green light systems, according to which practical and financial support is provided for the development of energy saving systems. [10]

EE consumption can be reduced due to a competent choice of lighting devices with the required light distribution, design, and optimal suspension height. Today, luminaires with fluorescent lamps (FL) are widely used for lighting public premises. When choosing lamps with FL, and other light sources, special attention must be paid to the optical efficiency, the higher it is, the better. [2]

The optical efficiency (CUA) of a luminaire largely depends on the reflector and diffuser used in the luminaire. Currently, for the production of diffusers for fluorescent lamps, polymethyl methacrylate, polycarbonate and light-stabilized polystyrene are used. During the operation of luminaires, the transmittance of diffusers decreases as a result of exposure to short-wavelength visible and ultraviolet radiation, which is present in the spectrum of lamps and in the spectrum of natural light.[5]

At the same time, the most effective now are fluorescent lamps of a new generation with a tube diameter of 16 mm (the so-called T5 lamps) for which only electronic high-frequency PRO (EPRO) are used. For example, an analogue of an FL in a T8 tube with a power of 36 W is an FL with a 16 mm bulb (T5) with a power of 28 W. The luminous fluxes of these lamps at an ambient temperature of 35 ° C, which corresponds to the actual temperature inside the lamp, are comparable. It is also worth noting the advantages of FL in the T5 tube: service life 24000 h; the decline in luminous flux by the end of the service life is no more than 10%; sharply reduced content of mercury in these lamps (from 30 to 3 mg); high color rendering index. The luminous efficiency of T5 fluorescent lamps is 105 lm/W. And the most promising at the moment are LEDs, the maximum achieved luminous efficiency is 303 lm/W. The luminous efficiency of serial samples at the moment is 140-150 lm/W. LEDs are gradually replacing other light sources, but price is a limiting factor for even more widespread adoption. [1]

A ballast is a lighting product, with the help of which the LS (light source) is powered from the electrical network, providing the necessary starting and operating modes of the LS. When choosing PRO, you need to understand that the LS parameters, including energy, depend on its quality. To facilitate the choice of PRO for FL from the point of view of energy efficiency, the Committee of the European Associations IMO and PRO (CELMA) proposed to classify PRO according to the energy efficiency index by EU directive 2000/55/EC. The EEI - Energy Efficiency Index - is applied to the PRO by the manufacturer (part of CELMA). For the consumer, this means that there are 7 classes depending on losses (table 1). The first 3 - A1 (most effective), A2 and A3 are EPRO, and the remaining 4 - B1, B2, C and D are electromagnetic PRO (EmPRO).

The efficiency of the ballast handling system

Lamp (code ILCOS)	Lamp power W		Ballast efficiency (Plamp/Pinput %)						
	EmPRO	EPRO	A1*	A2	A3	B1	B2	C	D
FD 18-E-G13-26	**18**	**16**	**-**	**< 19**	**< 21**	**< 24**	**< 26**	**< 28**	**> 28**
FD 36-E-G13-26	**36**	**32**	**-**	**< 36**	**< 38**	**< 41**	**< 43**	**< 45**	**> 45**
FD 58-E-G13-26	**58**	**50**	**-**	**< 55**	**< 59**	**< 64**	**< 67**	**< 67**	**> 70**

** dimmableEPRO [9]*

The above points give the efficiency of the main ballast system, which should be discussed with any supplier and a checklist has been formed.

For more information on how to ensure high efficiency of the energy saving system, a wide range of proposed resources for automated system management was analyzed.[8]

To assess the impact of the above recommendations on the technical and economic indicators of the educational institution, a comparison of the educational auditorium options was carried out. According to the current regulatory documents for classrooms, it is necessary to provide:

- illumination on the working surface 400Lx;

- illumination in the middle of the board E = 500Lx;

- the combined indicator of discomfort UGR is not more than 21;

- the coefficient of pulsation of illumination is no more than 10%, for offices for working with computers no more than 5%.

Automatic control. Automatic lighting control can be done in two ways. The first is to install a lighting system on each console. The second way is full automation using special sensors. In this case, the lighting system is activated when a person enters the room, and turns off a few seconds after he leaves the room.[4]

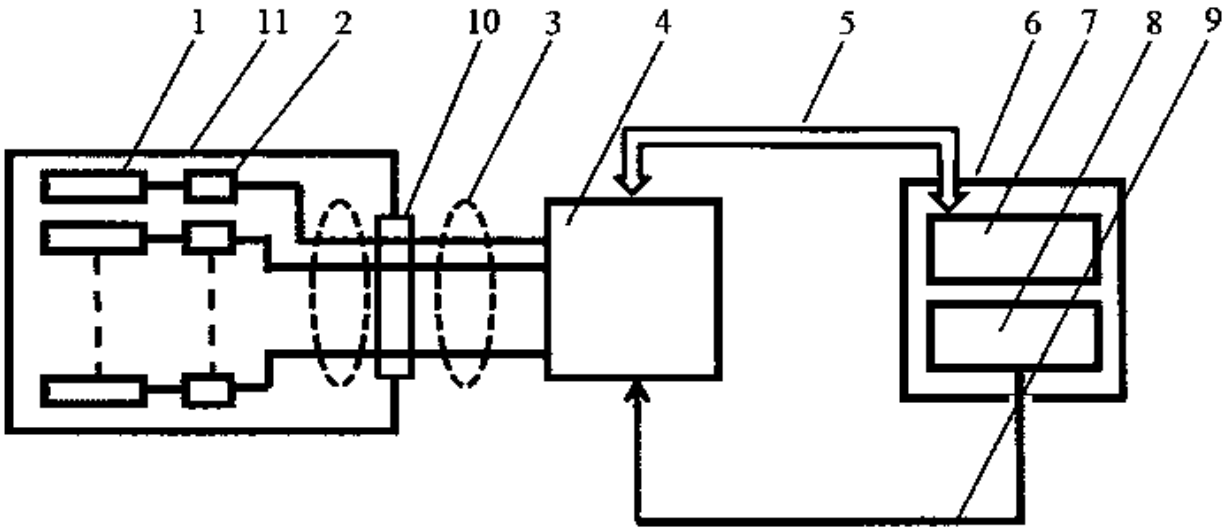
Lighting brightness control. This system allows you to control the flow of light by adding or removing light. This can be done using the remote control.

Lighting control during daylight hours. This system is quite complex, but very convenient. In cloudy weather on summer days, natural light may not be enough to illuminate rooms. In this case, a special sensor can be installed that detects the level of illumination and provides automatic ignition of the lamps at the desired level.

Traffic lighting control. Such systems are one of the main factors in energy saving and are useful in everyday life and utilities.

The main feature of this lighting system is that it only burns in the dark and in the presence of acoustic noise. The functional diagrams of the device are shown in the following figures:

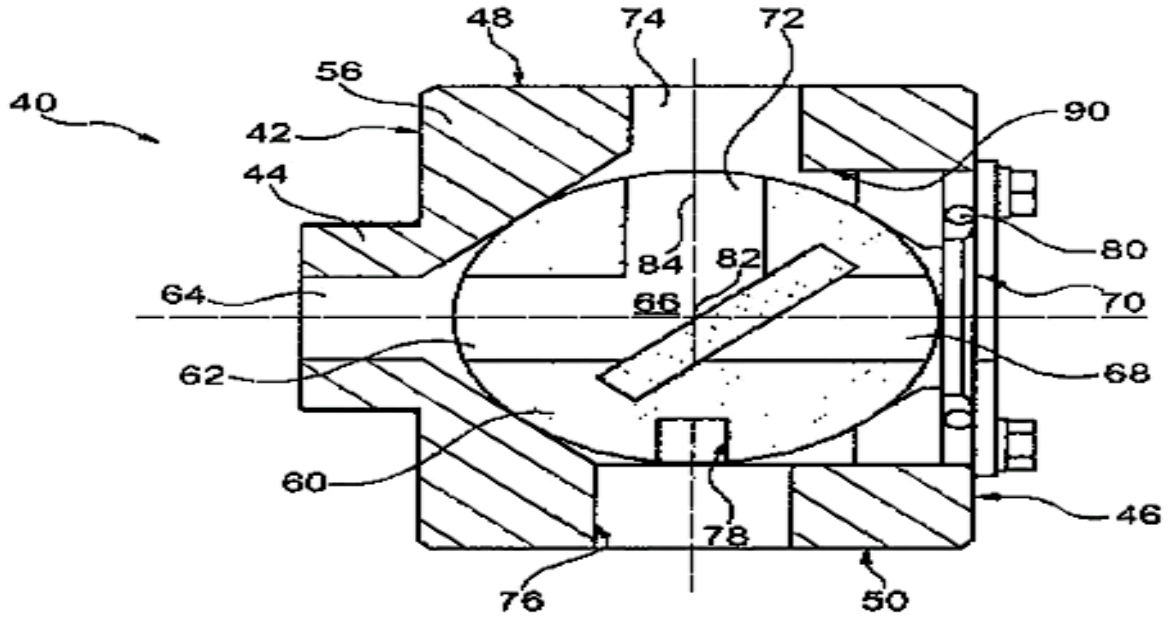
Figure 1. Functional diagram of the acoustic control device



The acoustic control system along the main pipes is designed to automatically control the movement of the flow inspection device (cleaning piston and defect detectors) along the pipe.

The data transmitted in this functional diagram is transmitted to the external control system via telemechanics (TM) or GSM channels. In this case, the processed acoustic signal of the piston movement is recorded in digital form in the internal memory of the acoustic control kits installed on the crane platforms and in the control room computer. [7]

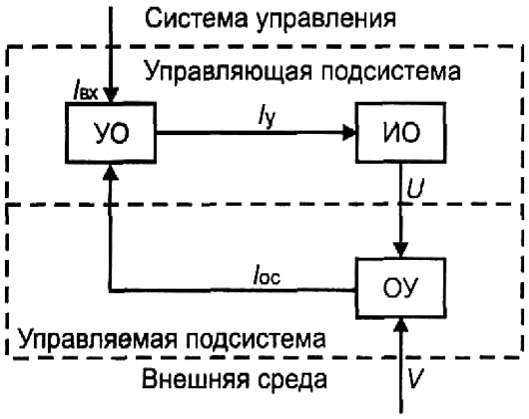
Figure 2. Functional diagram of the optical control device.



Optical inspection systems are usually designed to monitor 2D or 3D areas. Unlike conventional sensors, they have the ability to record and analyze detailed data over a fully observed area.

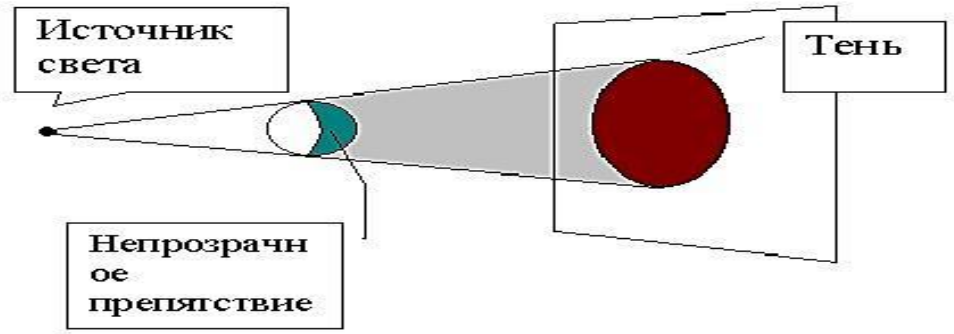
Optical surveillance systems provide a high level of security in a convenient sequence according to user requirements for various security processes and standard control functions.

Figure 3. Control system for optical and acoustic devices.



The principle of operation of the device is as follows: optical and acoustic changes affect the sensor, which generates signals at the outputs of optical and acoustic control systems. These signals are transmitted to the general control system and, in its turn, the general control system issues a signal that activates the light source.

Figure 4. View of a light source on a schematic diagram.



Conclusion. Most of the world's electricity is only used to drive binoculars. We can ensure the energy efficiency of buildings mainly by adopting and using factors to implement smart energy saving strategies. Without internal and external cooperation in the field of energy conservation, the technical regulation of many control strategies will not be successful, since energy savings cannot be achieved through their lighting conditions. Correctly designed and implemented energy efficient utility lighting systems do not violate working conditions. The following targets for progressive and industrial lighting systems are 1-3 W/m2/100 lx. In particular, saving energy is good. In this article, we've shown what energy efficient lighting can look like at a national or corporate level. [9]

REFERENCES:

1. Функциональные устройства систем электропитания наземной РЭА / В.В. Авдеев, В.Т. Костиков, А.М. Новожилов., В.И. Чистяков. Под ред. В.Г. Костикова. –М.: Радио и связь, 2000. –192 с.
2. Энергия тежамкорлик асослари. А.Раджабов., М.Ибрагимов., А.Бердышев. Ўқув қўлланма. – Тошкент, 2008.– 116-132 б.

3. Энерго - тежамкор иссиқхоналарни қуриш ва улардан фойдаланиш бўйича қўлланма. Н.Обломуродов., Б.Алимов., У.Ахмедов., А.Ашуров., Н.Дадаханова., М.Ниёзов. Ўқув қўлланма. – Тошкент, 2013. – 15, 26 б.

4. Потапкин Н.Н., Вишневский С.А., Ашрятов А.А. Повышение энергоэффективности осветительных установок общественных помещений // Современные проблемы науки и образования. – 2015. – № 2-1

5. Obidov, J. G. O. (2020). About safety technique and issues of supplying electricity of the textile industry. ACADEMICIA: An International Multidisciplinary Research Journal, 10(9), 123-127.

6. Умаралиев, Н., Матбабаев, М. М., & Эргашев, К. М. (2020). УСТАНОВКА ДЛЯ ИЗУЧЕНИЯ ОПТОЭЛЕКТРОННОГО ДАТЧИКА ВЛАЖНОСТИ ВОЗДУХА. Известия высших учебных заведений. Приборостроение, 63(3).

7. Ibrokhimov, J. M. (2020). Application of the solar combined systems consisting of the field of flat and parabolocylindrical collecting channels for hot water supply of the industrial factories. ACADEMICIA: AN INTERNATIONAL MULTIDISCIPLINARY RESEARCH JOURNAL, 10(12), 1293-1296.

8. Иброхимов, Ж. М. (2018). АСУ ТЕХНОЛОГИЧЕСКОГО ПРОЦЕССА НА ОСНОВЕ ИНТЕЛЛЕКТУАЛЬНОГО ОПТОЭЛЕКТРОННОГО СЕНСОРА. In Современные технологии в нефтегазовом деле-2018 (pp. 280-283).

9. Jamoldinovich, A. E. (2020). THE IMPORTANCE OF METROLOGY AND STANDARDIZATION TODAY Alikhonov Elmurod. INTERNATIONAL SCIENTIFIC AND TECHNICAL JOURNAL "INNOVATION TECHNICAL AND TECHNOLOGY", 1(4), 1-3.

Used websites:

1. https://lex.uz/

2. http://fizmat.by

3. https://www.dissercat.com/

4. https://uz.khanacademy.org/

5. https://www.indianjournals.com/ijor.aspx?target=ijor:aca&volume=10&issue=9&article=016

6. https://scholar.google.com/citations?user=lZTLeSYAAAAJ&hl=ru