YEOJU TECHNICAL INSTITUTE IN TASHKENT
CENTRAL ASIAN JOURNAL OF STEM
http://stem.ytit.uz/

MANY PEOPLE KNOW THAT CERTAIN DEVICES PROMISE CONSIDERABLE ECONOMIC ADVANTAGES BUT FEW ARE THOSE WHO KNOW AND UNDERSTAND THE CHARACTERISTICS OF EACH TYPE

Baratova Gulnoza Tashmuhammadovna
Senior lecturer of the «Energy and applied sciences» department, Yeoju Technical institute in Tashkent.
Muhammad Maftun Dilmurodzoda
-Senior lecturer of the «Energy and applied sciences» department, Yeoju Technical institute in Tashkent.

Annotation. Energy serves as the basis for any process in all sectors of the national economy, it is the main condition for creating material wealth, and improving the standards of living. Traditional energy sources include thermal power plants, nuclear power plants, and hydroelectric power plants. Humanity consumes a huge amount of energy 75% of all energy consumed is minerals (34% - oil, 25% - coal, 19% - natural gas). Constantly rising electricity tariffs are reason enough to think about all the possible ways to save money, since the share accounted for by lighting devices is quite large. Many people know about devices only that they promise significant savings, but few can say that they know exact characteristics of each type, their difference from competitors.

Key words: LEDs, pulse, energy saving, ripple, spectrum.

Аннотация. Энергетика служит основой любых процессов во всех отраслях народного хозяйства, главным условием создания материальных благ, повышения уровня жизни людей. К традиционным источникам энергии относятся ТЭС, АЭС, ГЭС. Человечество потребляет огромное количество энергии 75% всей потребляемой энергии составляют полезные ископаемые (34% - нефть, 25% - уголь, 19% - природный газ). Постоянно растущие тарифы на электроэнергию — достаточная причина для размышлений обо всех возможных способах экономии. Поскольку доля, приходящаяся на осветительные приборы, довольно велика. Многие знают о приборах только то, что они обещают значительную экономию, однако мало кто может сказать, что точно знает характеристики каждого вида, их отличие от конкурентов. Чтобы выбрать подходящее, наиболее эффективное устройство, нужно быть хорошо осведомленным о принципах работы приборов, о том, на какие критерии необходимо обращать внимание в первую очередь.

Ключевые слова: светодиоды, импульс, энергосберегающие, пульсация, спектр.

RELEVANCE OF THE TOPIC

It is known form school Physics courses, that the efficiency in traditional incandescent bulbs is very small, and at best reaches 50 percent. Thus, only half of the electricity consumed by the incandescent lamp, for which we paid, was spent to the actual lightning of an apartment or room. The second half of the consumed electricity was spent on heating the incandescent light bulb. At the beginning of the XIX century, many people worked on the problem of electric lightning, much research was carried out on the light effect of incandescence of different materials. The scientists had to look for conductors which would not overheat, melt or ignite while giving light. It was important to determine a successful combination of the filament and the environment that surrounds it. To protect the threads from exposure to oxygen, they started to use a flask. Experiments in this field were actively held by an English scientist H. Davy and by a Belgian researcher B. Jobard. Considering the question of inventor of the light bulb, it is important to mention the Russian scientist Alexander Lodigin. In 1874 he received the right to manufacture a light bulb with carbon electrodes. It was he who suggested the use of tungsten and molybdenum as a spiral. These metals resisted temperature exposure well, which significantly increased the service life of the device. Moreover, the inventor of the lamp proposed that the air be removed from the bulb in order to slow down the coil oxidation process.

Device and the principle of operation of an incandescent lamp.

The incandescent lamp- is an electrical source, heats up to a high temperature due to the flow of electricity through it, and as a result it emits in a wide spectral range, including a visible light. Currently, tungsten alloy spiral is used as a filament body. The lamp uses the effect of the heating conductor (incandescent body) when flowing through it. The bar function has a maximum position on the wavelength scale which depends on temperature. This maximum shifts with increasing temperature towards shorter wavelengths. To obtain visible radiation, the temperature must be several thousand degrees. At 5770 (surface temperature) the light matches the spectrum of the Sun. The lower the temperature, the lower the proportion of visible light is, and the more “red” radiation appears.

Part of the electrical energy consumed by the incandescent lamp converts into radiation, the other part of it disappears as a result of the processes of heat conduction and convection. To increase the efficiency of a lamp and to obtain the maximum “white” light, it is necessary to increase the temperature of the filament, which in turn is limited by the properties of the filament material. A temperature 5771 K is unattainable, because at such a temperature any material melts, collapses and ceases to conduct electricity. In modern incandescent lamps, materials are used with maximum melting points (3410 degrees) and very rarely 3045 °C).

The first lamps were vacuum; currently only low-power lamps (lamps for general purposes- up to 25 watt) are made in an evacuated flask. The bulbs of more powerful lamps are filled with an inert gas. The filament is made of metal with lower conductivity, which allows resistance to increase with temperature. This design

automatically stabilizes the lamp power at a given level when connected to a voltage source.

Advantages:

- low price
- small size
- absence of control gear
- insensitivity to ionizing radiation
- pure electrical resistance
- instant ignition
- low sensitivity to power failures and power surges
- absence of toxic components and, as a consequence, no need for infrastructure for collection and disposal
- the possibility to work on any electrical current
- insensitivity to voltage polarity
- the possibility to manufacture lamps for a wide variety of voltages (from fractions of a volt to hundreds of volts)
- no clicker when working on alternating electricity (important in factories)
- no hum when operating on alternating electricity
- continuous spectrum
- a pleasant and familiar spectrum in everyday life
- resistance to electromagnetic impulse

Limitations:

- relatively short service life
- fragility, sensitivity to shock and vibration
- inrush electricity
- if the thread breaks under tension, the bulb may burst
- sharp dependence of luminous efficacy and service life on voltage
- heating of lamp parts requires heat-resistant fixtures

LED lamps are now considered as ideal devices. They are as durable as possible (even in comparison with luminescent devices), are devoid of the disadvantages inherent in lamps with a phosphor. The light source in them is an LED-diode, the electronic circuit is responsible for its operation.

Power of energy-savings lamps and luminous flux

Power, measured in watts, characterizes how much electrical energy is required to provide the required illumination rate, measured in lux. Sanitary standards set various norms for the illumination of residential, office and industrial premises.

Table: The norm of illumination of residential and domestic premises

The name of a room	Surface illumination by artificial light sources (lx)
Living rooms, bedrooms	150
Dining rooms, kitchens	150
Children`s rooms	200
Offices, workshops, libraries	300
Halls	50
Bathrooms, toilets	50
Utility rooms	30

Power is the main criterion when choosing any electrical appliance. In the given case it is the color rendition. To buy a suitable product, the power of the «classics» is divided by 5. For clarity, it is possible to give the following example, if the chandelier contains traditional 100 W light bulbs, then for the economy, an ideal parameter would be five times less-20W. Another privilege is also low power consumption. In this case the type and the size of a lamp should be considered. This indicator may vary depending on the specific model. An LED lamp does not contain breakable elements that can harm one's health as a conventional lamp has. Such devices are resistant to vibrations and various mechanical influences. According to the assurances of many manufacturers, the lightning equipment also copes well with climatic conditions and is capable of operating at temperatures from -60 to + 60 degrees. Lamps are produced for any type of voltage, which eliminates the need to install various types of ballast resistors. LED lights also have a very short illumination range. At the moment, the illumination of the scattered light emitted by LEDs is only a few tens of meters. This makes the devices suitable for low beam purposes, but also makes them a poor choice for long range lightning. Manufacturers hope to resolve this problem over time.

REFERENCES

1.F. E. Shubert (2008) Svetodioidi (Light-emitting Diodes) M: Fizmatlit

2. A.M. Yurshin (2013) Sovremennie svetodioidi. Spravochnik (Modern Light-emitting Diodes. Handbook) M.: Radiosoft.

3. T. Ookosi. Optoelektronika i opticheskaya svyaz: per s yap. A. A. Genina; pod red kand fiz-mat nauk M. I. Belovolova. (Optoelectronics and Optical Communication: translated from Janapese by A. A. Genin; editor PhD in Physics and Mathematics M. I. Belovolov.)

4. Y. Ayhler, G. I. Ayhler. (2012) Lazeri. Ispolnenie, upravlenie, primenenie (uchebnoe posobie), per. s nem. L. N. Kazancevoi. (Lazers. Use, Management, Application (manual), translated from German by L. I. Kazanceva M: Texnosfera

5.O. Ermakov. (2004) Prikladnaya optoelektronika. (Applied Optoelectronics) M: Texnosfera

6.A. N. Ignatov. (2011) Optoelektronika i nanofotonika. (Optoelectronics and Nanophotonics) SPb.: Lan

7. N. Rozensher, B. Vinter. (2004) Optoelektronika: per. s fr. pod. red. O. N. Ermakova. (Optoelectronics: translated from French, editor O. N. Ermakova) M: Texnosfera

8. L. N. Kurbatov. (2013) Optoelektronika vidimogo i infrakrasnogo diapazonov spektra (Optoelectronics of Visible and Infrared Range) M: Fizmatgiz

9. Y.G. Shreter, Y.T. Rebane, V.A. Zikov, V.G. Sidorov. (2001) Shirokozonnie poluprovodniki (**Large-Gap Semiconductor**). SPb.: Nauka

10. M. Kneissl, T. Kolbe, C. Chua, V. Kueller, N. Lobo, J. Stellmach, A. Knauer, H. Rodriguez, S. Einfeldt, Z. Yang, N.M. Johnson, M. Weyers. Advances in group III-nitride-based deep UV light-emitting diode technology // Semiconductor Science and Technology. 2011. V. 26. Art. 014036.