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DEVELOPMENT OF THE ENERGY SUPPLY SYSTEM FOR A MULTI-STORY RESIDENTIAL BUILDING

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In Ukraine, a large-scale housing construction program continues, even during times of conflict. Distribution networks supply electricity to residential buildings, public institutions, and industrial enterprises. The majority of the electricity generated in the country is transmitted through urban and rural distribution networks.

As electricity consumption grows, so do the requirements for the reliability of electrical networks and the quality of power supply. This increase in consumption is associated with the widespread use of electricity in all aspects of human life. Modern residential buildings are equipped with a large amount of electrical equipment, requiring a new approach—accurate calculation, rational expenditure planning, and the use of modern protection and automation systems.

With the development of the electricity market, there is a need to enhance electricity consumption management. One way to address this is through precise control and monitoring of electricity, contributing to overall energy conservation. Technological support for the electricity market includes systems, devices, and algorithms for controlling and managing energy consumption parameters. The foundation of this support is automated systems for monitoring and accounting of electricity consumption.

The issue of electricity supply and ensuring the quality and reliability of power supply in residential buildings remains relevant. The research aims to build a rational power supply system for a multi-story residential building that ensures the necessary level of power supply reliability for consumers and takes into account the economic interests of electricity suppliers and consumers.

The following tasks are set within the research:

Conduct calculations of electrical loads and justify the choice of power transformer.

Choose the power supply scheme.

Determine the cross-sections and types of cables for 0.4 kV cable lines and the cross-section of cables for lighting.

Conduct short-circuit current calculations.

Select and verify switching and protective devices for power and distribution networks.

Address the issue of increasing the efficiency of energy consumption management.

The development of the power supply system is complicated by a large number of regulations and requirements, the need for accurate calculations of electrical loads, and the application of rational approaches to energy use. Electrical consumers in multi-story residential buildings fall into the first or second category of power supply

reliability (according to norms [1]) and require connection from two independent sources.

The object of the research is the placement of all elements of the electrical network on the object, as well as the relevant regulatory requirements to be followed during the design of the power supply for a multi-story residential building.

During the design of the power supply system, the key is the selection of the optimal location of the power source for electricity consumers. The most advantageous location of the power source (main low-voltage substation, central substation, etc.) is the point where the center of electrical loads is concentrated [2].

If the power source is located in the center of electrical loads, the costs for the power supply system reach a minimum value, as the loads are symmetrically distributed around the center. Proper construction of the electrical power supply scheme, careful selection of the necessary equipment, accurate calculations of electrical loads and conductor cross-sections, and the installation of protection at all levels of the power supply network will ensure ease of operation, as well as a high level of security for the object.

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INVESTIGATION OF TRANSIENT PROCESSES IN THE SYSTEM «INVERTER – ASYNCHRONOUS MOTOR» OF THE ELECTRIC DRIVE OF A PUMP INSTALLATION

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In the world, active research is being conducted on the development of multilevel voltage inverters, including three-level ones. The scheme with limiting diodes (or the fixed neutral point scheme) is the most suitable for such converters as it requires fewer capacitive elements and only one DC power source. However, this scheme poses a challenge in controlling the voltage on the input capacitors. Many pulse width modulation (PWM) algorithms proposed in various sources do not address this issue. Some do not investigate the converter's operation under loads with electric motors, which is most commonly used, or focus solely on studying the output voltage spectrum.

Research on the operation of a three-level inverter is highly relevant. Despite the complexity of control due to the large number of semiconductor switches and high voltages, they demonstrate high-quality output voltage. The main advantage of such converters lies in distributing the voltage among the switches, allowing the use of switches with lower voltage but capable of operating at higher switching frequencies, instead of selecting one switch for high voltage.