

**THE PROBLEMS OF POWER SUPPLY SYSTEMS WITH RENEWABLE ENERGY  
SOURCES OF THE EQUIPMENT'S AND OBJECTS OF DIGITAL TECHNOLOGIES  
AND THE WAYS OF THEIR DECISIONS**

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**Abstract.** *This scientific article was supplemented with the results of research solutions obtained within the framework of the project 101128871-ERASMUS-EDU-2023-CBHE “Development of the targeted Educational program for Bachelors in Solar Energy in Uzbekistan” (DEBSEUz, 2023-2026 y.y.). Global demand for renewable energy sources is increasing day by day, including environmentally friendly, easy to install and maintain, and taking into account the fact that the sun shines more than three hundred days a year it is great to provide the energy produced by solar panels to the consumers of manufacturing enterprises and households it is noted that in this regard, the implementation of on-grid and off-grid systems for providing consumers with continuous energy, the introduction of systematic control and management methods of the quality indicators and quantity of generated electricity, and their practical application are considered to be the main issues. Controlling the consumption of reactive power that creates a magnetic field and current in digital technologies equipment's and devices research of electromagnetic current converters, which allow for the evaluation of reactive power and electric current asymmetry and non-sinusoidal indicators, remote measurement of these quantities with appropriate devices, control and conversion to a standard signal, are considered urgent issues.*

**Key words:** *power supply, electromagnetic current converter, stator windings, reactive power, symmetrical, non-sinusoidal, converter, electromagnetic, solar panels, batteries, sensitivity.*

**Introduction:** If will paid attention to the whole world's experience in talking about the advantages of solar energy sources, according to the calculations of international organizations, due to economic development, the demand for energy will increase by 50 percent by 2030 compared to the beginning of our century, and the total need 23, which is 27 billion tons of conventional fuel [1].

It is known from the analyzes and research that at the moment, a number of scientific research works are being carried out to control and manage the reactive power consumption of asynchronous motors, which are considered the main consumers of electricity produced by the production enterprises of republic and the solar panels installed in the houses of the residents, but these problems have not been sufficiently studied for digital technologies equipment's and devices powered by a phases of solar energy source [2-5].

Allows to accurately and reliably change and control magnetic currents. The research scheme of a three-phase digital technologies equipment's and devices supplied from a single-phase power supply nets is presented in fig.1.

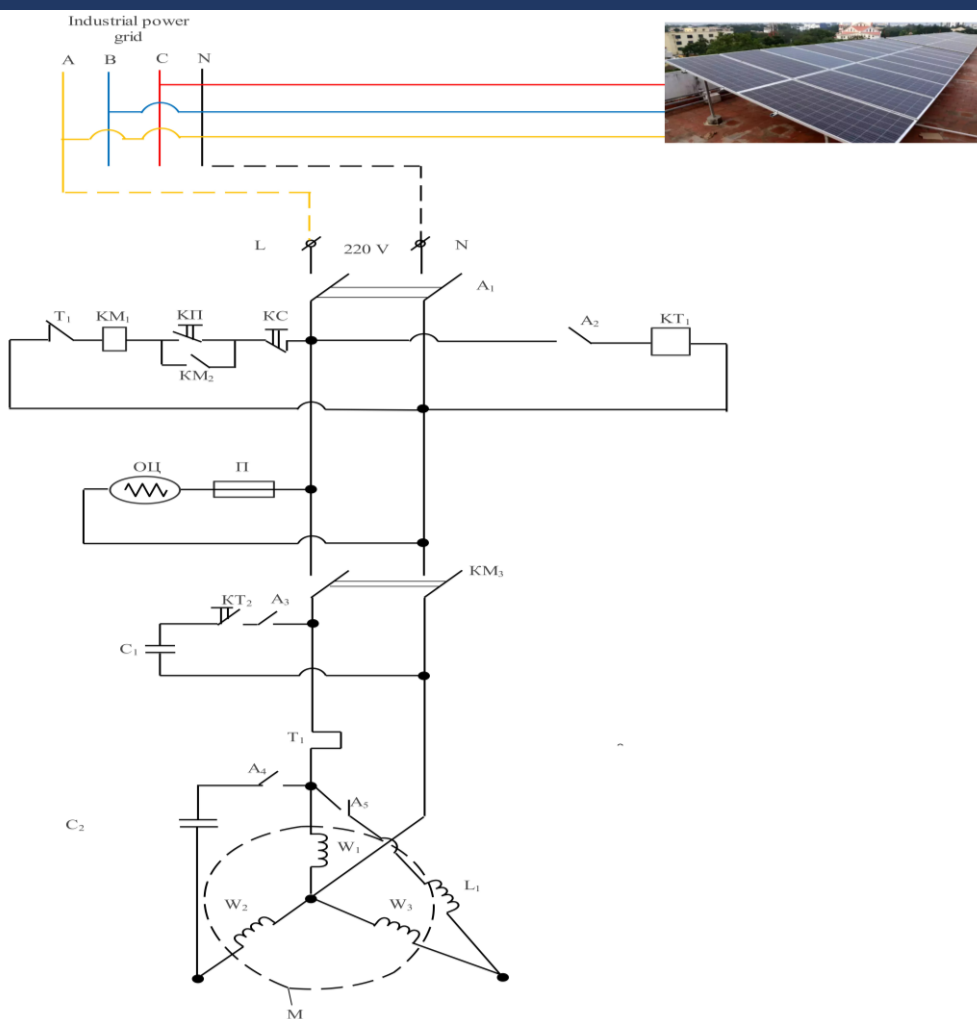


Figure 1. Research scheme of digital technologies equipment's and devices supplied from a single-phase power supply nets.

L- one phase of a three-phase power supply nets, N- neutral, A<sub>1</sub>,A<sub>2</sub>,A<sub>3</sub>,A<sub>4</sub>,A<sub>5</sub>- automatic magnetic circuit breakers, KП- launch button, KC- stop button, KM<sub>1</sub>,KM<sub>2</sub>- magnetic starters, T<sub>1</sub>- thermal relay, KT<sub>1</sub>- time relay, C<sub>1</sub>- reactive power source (static capacitor battery) C<sub>1</sub> va L<sub>1</sub>- capacitive and inductive elements that shift the angle between current and voltage, phase W<sub>1</sub>, W<sub>2</sub>, W<sub>3</sub>- asynchronous motor stator coils, OИ- Oscillograph, П- soluble preservative, M- digital technologies equipment's and devices.

In laboratory conditions, when the load is changed in phase A of a 250 kVA digital technologies equipment's and devices, the results of the output signal of the measuring element in the measuring devices are presented in fig. 3.

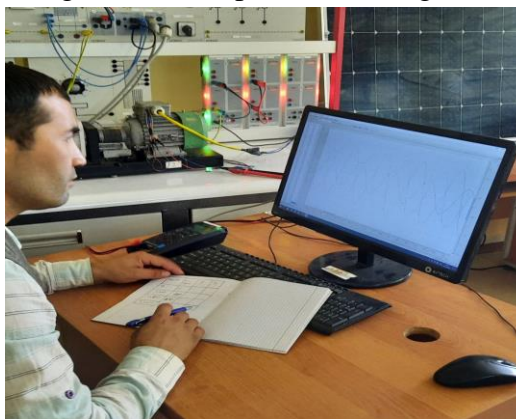


Figure 3. The process of receiving a signal from digital technologies equipment's and devices and its measuring circuit provided by the energy source produced by solar panels in CAYSLAB laboratory devices.

When the digital technologies equipment's and devices operates from a single-phase network, the output signals from the electromagnetic current converter are measured on the basis of the static descriptions of the graph theory, the number of windings of the sensitive element is proportional to the output signals, and when choosing the sensitive element rings, the stator windings of the asynchronous motor are selected based on the size of the grooves (grooves). Measuring sensitive element rings are required to be fast, accurate, reliable, and have a compact geometric size, while also being able to provide a standard voltage of 5 V [8-14].

**The result:** The theoretical and practical results of the static description of the output voltage of the electromagnetic current converter for a single-phase digital technologies equipment's and devices obtained from the results of the research can be seen. The static description of phase A and output voltage of the current transformer is presented in fig. 4.

$$\Delta U_{A\ out} = \frac{U_{pract} - U_{theor.}}{U_{pract}} = \frac{3,85 - 3,84}{3,85} 100\% = 0,2\%$$

The static description of the digital technologies equipment's and devices was obtained using the CAYSLAB device, and the theoretical values and practical results of the appearance of output signals provided the following asymmetry index:

$$\Delta U_{symmetrical\ size} = \frac{\Delta U_{Aout} + \Delta U_{Bout} + \Delta U_{Cout}}{U_{prakt}} =$$

$$= \frac{0,2 + 0,5 + 0,04}{3} 100\% = 0.7\%$$

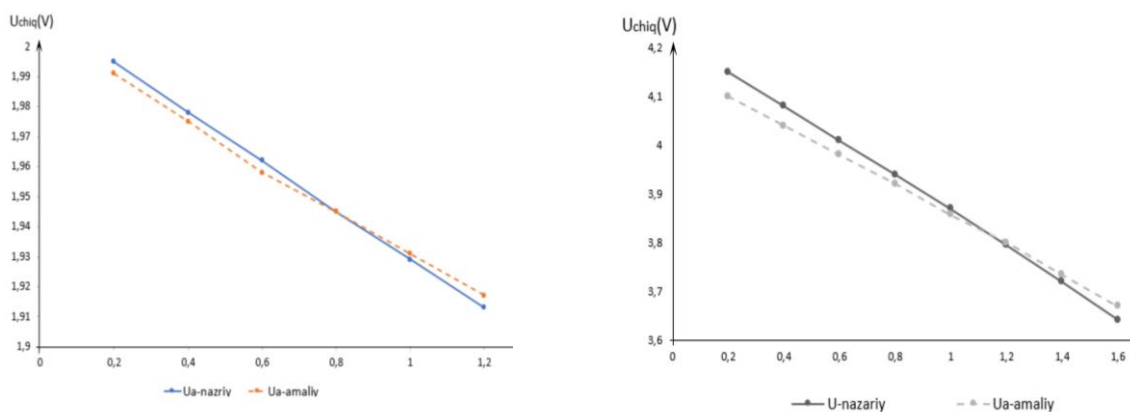


Figure 4. Static characteristics of the A phase and output voltage of the current transformer: a) - output description of the circuit with a capacitor battery, b) - output description of the circuit without a capacitor battery

**Discussion:** From the obtained results, it can be seen that the developed three-phase current electromagnetic transformer has the advantages of high accuracy, high reliability, compact form and accurate, complete and fast delivery of information compared to classical current transformers. application in digital technologies equipment's and devices used in households gives positive results.

**Summary:** Research results show that energy and power losses of digital technologies equipment's and devices are significantly increased during overloading and when the the affected by temperature, especially after repair, as a result of a sharp increase in its non-symmetry and non-sinusoidal indicators. increase is observed. Considering that digital technologies equipment's and

devices are the most common in practice, measuring and controlling the amount of reactive power consumed by them, controlling three-phase currents through an electromagnetic converter can be a solution to this problem.

The fact that the static description of the current transformer is straight line, it has advantages such as simplicity, accuracy, and compactness over other types of signal transformers, and it is useful in solving problems in the field of practical application with the workability and suitability of the working environment.

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