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THE MAIN REQUIREMENTS OF CLOUD COMPUTING MONITORING FOR PRIMARY MEASURING CONVERTERS OF THE POWER SUPPLY SYSTEM WITH SPECIFIC LOADS

Abstract: Large-scale measures are being taken in the republic to further improve the energy sector, the widespread use of renewable energy sources, as well as the creation of elements, devices and a complex for monitoring the quality indicators of reactive power of electricity supply systems. The article discusses the development and requirements of converters of quantities and parameters for Cloud Computing monitoring of power supply with a unified output value in the form of secondary voltage.

Keywords: Cloud Computing, primary current measuring converters, monitoring of electrical quantities and parameters, asymmetry, non-sinusoidality, reactive power compensation.

Introduction.

Currently, in the world, the use of digital monitoring technology based on Cloud Computing with converters of quantities and parameters of electric current with high accuracy, the expansion of the spectrum of converted quantities and parameters is limited due to insufficient formation of the principles of building elements, devices, monitoring and control, calculation and design methods based on modern Cloud Computing technology. In addition, the classical methods and models used for monitoring electrical quantities and parameters, as well as elements and monitoring and control devices, do not provide the necessary accuracy, especially in the presence of specific factors of three-phase currents of the electrical network with specific loads, such as asymmetry, non-sinusoidal, concentration and distribution of electrical, magnetic, etc. parameters.

Materials and methods.

Important and contradictory requirements for the designs of converters of values and parameters of three-phase current in Cloud Computing monitoring power supply as an increase in accuracy, linearity, providing a unified value at the output, expanding the range of possible conversion functions, reducing weight, structural dimensions, improving manufacturability and simplifying assembly are not always provided at once.

Results.

Solving the problem of choosing converters of values and parameters of three-phase current to voltage with Cloud Computing monitoring, power supply is carried out either by improving existing methods and methods of conversion or design, or by introducing and improving the principles of constructing elements and conversion systems and physical and technical effects [1].

When improving the principles of conversion, development and design of converters of values and parameters of three-phase current to voltage, Cloud Computing power supply monitoring is preceded by criteria that determine the main characteristics in accordance with the

specifics of application in monitoring and control systems, for example, reactive power monitoring. These criteria can be formulated as a single requirement for current converters: operating conditions, information, energy, metrological, technical characteristics and design designs [2-4]. For example: the operating conditions of converters of values and parameters of three-phase current to voltage include restrictions on ambient temperature, relative humidity, vibration level, shock loads, radiation effects [5, 6], metrological working conditions include requirements for the range of the converted primary current, frequency band, accuracy, speed, ratio of useful output levels the magnitude and interference, the coverage of a variety of physical nature of the converted current, the design conditions include mass, size, unification, manufacturability, simplicity of design, reliability and stability of characteristics [7].

Currently, there is no generalized quantitative assessment of the quality of functioning of three-phase current converters and parameters for Cloud Computing power supply monitoring, therefore, based on the scope of current converters, parameters such as accuracy when taking into account the asymmetry of three-phase current, reliability, degree of unification, etc. are used. Recently, preference has also been given to economic indicators.

Requirements for converters of quantities and parameters from the Cloud Computing side of power supply monitoring when building a specific design and conversion system additionally requires taking into account the fulfillment of such special conditions as:

- asymmetry of both active and reactive currents in phases of three-phase power supply [8];
- non-linearity associated with the nature of electrical loads [9];
- phase shifts between currents and voltage due to electromagnetic principles of current conversion [9];
- reactivity of the nature of controlled power and energy power supply [10];
- the complexity of the sources and conditions for creating a magnetic flux and field in the conversion circuit [10].

The analysis of the requirements allows us to conclude that in order to build perfect, wide-range converters of quantities and parameters for Cloud Computing monitoring of power supply and unification of signals at their output, it is necessary to use electromagnetic elements with an inhomogeneous, nonlinear and distributed structure. High accuracy, functional flexibility, versatility, uniformity of the output signal and reliability distinguish converters of values and parameters of reactive power of three-phase current from others.

The development and implementation of converters of quantities and parameters for Cloud Computing power supply monitoring with a unified output value in the form of secondary voltage, high accuracy, advanced functionality is provided based on the application of a developed topological graph method and calculation model, the study of complex distributed magnetic conversion circuits and the use of modern sensing elements [11, 15].

As shown by the studies conducted in the power supply, the loss of electricity in the electrical networks is 8-12% of the production volume. To reduce these losses, it is necessary to: correctly determine electrical loads by using Cloud Computing monitoring, efficiently transmit and distribute electrical energy; ensure the necessary degree of reliability; ensure the necessary quality of electricity; ensure electromagnetic compatibility of the receiver with the network; save electricity. Monitoring measures that can provide the above tasks are the creation of controlled means of generating electricity that improves quality; reduction of losses is achieved by compensating reactive power, increasing the load of transformers, reducing losses in them, bringing transformers closer to loads, using economical equipment and optimizing its operating modes, as well as the use of automatic power supply management systems. Cloud Computing monitoring of the power supply operation mode is characterized by three parameters: voltage, current and power. Specific electrical loads, i.e. power and energy, worsen the performance of

the power supply, that is, the loading of power plant generators with currents increases fuel consumption; losses in the power supply and electrical receivers increase; the voltage drop in the power supply increases.

The connection diagram of power supply sources and consumers with the possibility of evaluating energy efficiency using the Cloud Computing monitoring model, installation and connection of primary current measuring converters is shown in Figure 1.1.

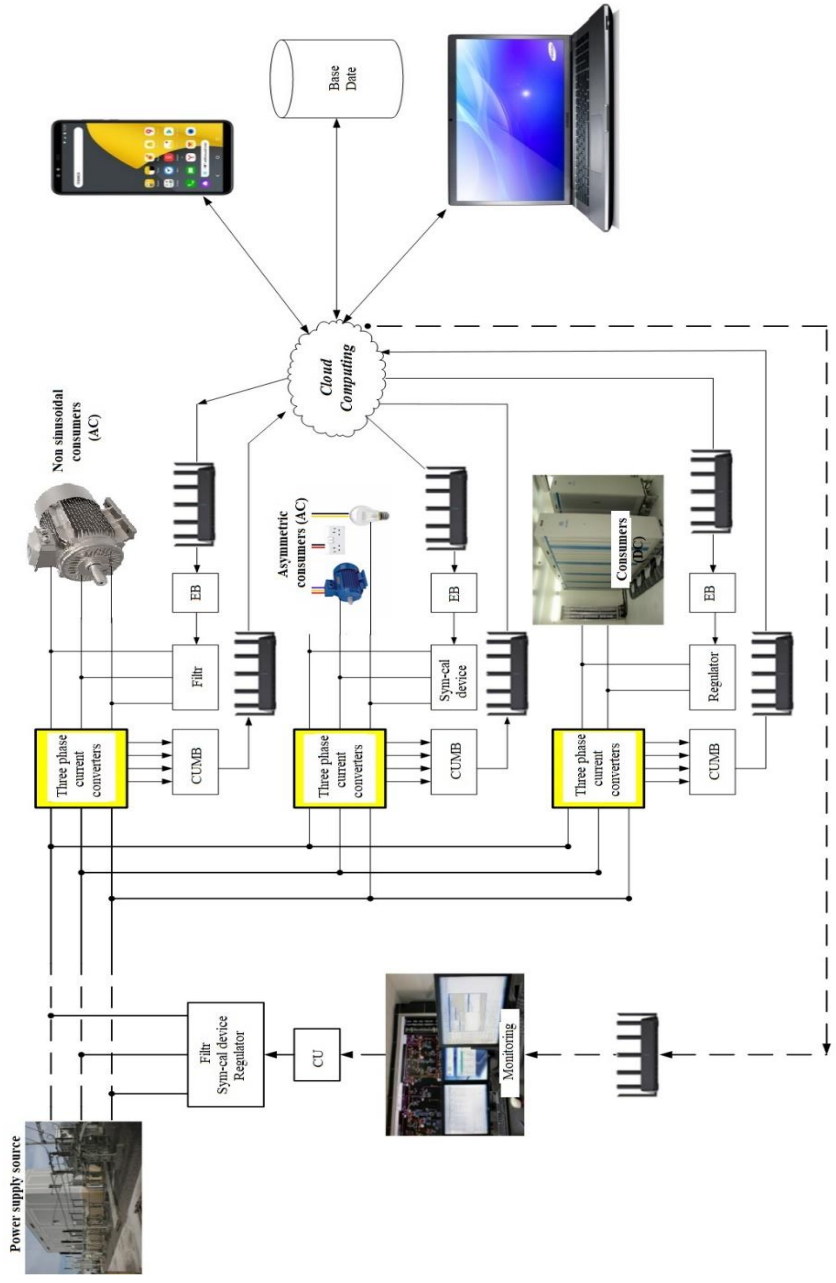

Figure 1.1 - Scheme of connection of sources and consumers of power supply with the possibility of Cloud Computing monitoring model

The connection scheme of sources and consumers according to the Cloud Computing monitoring model consists of three-phase current power supply sources, three-phase current converters, control unit of measuring bodies (CUMB), executive bodies (EB), non-sinusoidal

consumers - AC, asymmetric consumers (AC), direct current consumers (DC), filters, control unit.

In Figure 1.2 shows a general overview of the services of the Cloud Computing monitoring model provided by the Internet to study the values and parameters of power supply [12].

The following Cloud Computing monitoring technologies were used in the study [12]:
- Software (SaaC).
- Platform (PaaC).
- Infrastrucche (IaaC).

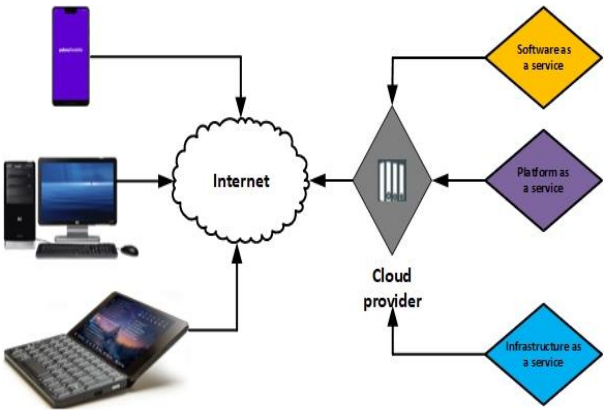

Figure 1.2 - Cloud Computing model of power supply monitoring technology

Discussion

In the form of an IoT app www.reactive-energy.uz the materials on the Cloud Computing monitoring model, the algorithm of the research software and software, allowing to evaluate the effectiveness of reactive power sources, are presented.

The Cloud Computing monitoring model in the form of an "Algorithm and software for calculating the timing of covering the costs of introducing reactive power sources into the power supply system", registered with the Intellectual Property Agency of the Republic of Uzbekistan, contains research algorithms, software, and includes the possibility of selective monitoring by sources and receivers, procedures for reducing the costs of their implementation and calculating the efficiency of production and consumption and is designed to conduct research on the indicators of reactive power of electric power supply [13, 14].

Conclusion

Transformations with linear, nonlinear, homogeneous and heterogeneous, concentrated and distributed quantities and parameters ensure the concentration of work flows created by the currents of electrical networks and are processes in Cloud Computing monitoring of power supply while providing the necessary information and the magnitude of the monitoring output signal.

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