STUDY OF ELECTRICITY QUALITY INDICATORS IN INDUSTRIAL ENTERPRISES

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ABSTRACT

Power supply of industrial enterprises, factors influencing the quality of electricity in enterprises and their economic losses, management of power supply systems in industrial enterprises, evaluation of electrical parameters in industrial enterprises, synchronized vector measurement system errors, vector measurement system accuracy assessment, industrial enterprise power supply system to study technical solutions to achieve energy efficiency by improving quality indicators.

Keywords: Industrial power grid, electricity quality, quality assessment, energy quality decline, impact of quality decline on enterprise performance, voltage fluctuations, energy spectrum, frequency range, energy efficiency, study of technical solutions.

INTRODUCTION

It is known that industrial enterprises operating in the territory of the Republic today are the main consumers of electricity. About 55% of the total electricity generated is used in the production process of industrial enterprises. The main consumers of electricity in industrial enterprises are compressors, fans, pumps and lifting-transport devices with lOkV voltage, lathes, electric machines with a voltage of 660-380-220V, electric furnaces, electrical equipment with a voltage of 1000 V ha. While today's current topic is focused on improving energy efficiency in order to save natural resources, the first indicator that determines electricity efficiency is electricity quality indicators.

An indicator of the quality of electricity is the value of energy under the conditions necessary for the consumer to fully perform the function of the device. Improving the quality of electricity not only prevents energy inefficiency, but also ensures the long-term service of large energy-consuming devices of the above-mentioned industrial enterprises, and prevents inconveniences in the production process. Why is it necessary to introduce changes in the quality of electricity in industrial enterprises? primarily to ensure safety in industrial zones. There is a risk of mass poisoning at the plant if the fans stop operating in seconds due to changes in energy quality in the fans of petrochemical plants. Therefore, the implementation of this area is one of the constant

areas of demand. It is also necessary to analyze the economic, technical, mathematical aspects in solving the problem of improving the quality of electricity. The quality value of electricity in industrial enterprises is determined by its voltage and frequency, the magnitude of the change depends on the nosinusoidality of electrical values, the symmetry of voltages. Deviation of this indicator from the nominal value leads to premature wear of mechanisms in the production process, deterioration of product quality, process delays, reduced efficiency.

Factors influencing quality indicators: environmental factors (temperature, humidity, air composition) mechanical factors (types of conductors, conductor composition, conductors, power distributors) Process factors (overload in the production process, work mode imbalance, poor quality devices in the network, obsolete stations, obsolete production mechanisms) they lead to deterioration of energy quality indicators and inefficient use of energy (for example, consumption as electrical heat).

METHODOLOGY

Research methods. The values of the quality parameters of the power grid are determined using direct and indirect methods. However, there are some parameters in the quality indicators that can be measured only indirectly, for example, RMS. High doses of voltage current can also be fired indirectly.

Methods of studying electrical quality indicators in industrial enterprises

1. From different types of analog-to-digital converters (ADCs) to determine voltage and current values,
2. Resistor
3. Computing devices for display processing

In general, there are 2 different methods of studying the quality of electricity in industrial enterprises, which are traditional and modern methods. Traditional methods, in turn, are directly calculated and carried out by engineers and require a very large code of labor.

ANALYSIS OF THE LITERATURE ON THE SUBJECT

Energy quality indicators and standards in the power grid in Uzbekistan are set by the interstate standard GOST 32144-2013 for all types of modes listed.

Electricity quality indicators

- frequency deviation;
- steady-state voltage deviation;
- voltage fluctuations characterized by a range of voltage fluctuations and doses;
- coefficient of the harmonic component
- the distortion factor of the sinusoidal voltage curve;
- unbalanced coefficient of negative sequence voltage;
- zero-sequence voltage equilibrium coefficient;

- duration of voltage drop;
- pulse voltage;
- temporary overvoltage factor.

As the indicator is evaluated by the results.

Frequency deviation is the average value that indicates the difference between the nominal value and the actual value at 10 minute intervals. Under normal conditions, the frequency deviation is allowed to vary by 0.1 Gs from the nominal value. In the short term, it can change to 0.2 Gs.

Frequency oscillation is the difference between the maximum and minimum values of the fundamental frequency in the rapid change of the regime parameters, when the rate of change of frequency is less than 0.2 Gs per second.

The oscillation of the frequency shall not exceed 0.2 Gs, except for the permissible deviation of 0.1 Gs.

Voltage deviation indicator is the difference between the actual value of the voltage and its nominal value in the case of a gradual change in the operating mode in industrial enterprises, ie the rate of change of voltage does not exceed 1% per second.

-5 + 10% when driving and operating on the clamps of electric drives and apparatus;

-2.5 + 5% on stationery clamps; The remaining 5% is in the electrical consumer terminals. In the aftermath of an accident, an additional 5% voltage drop is allowed.

Voltage oscillation index is the difference between the maximum and minimum values of the voltage at the required rate of change of operating mode, ie the rate of change of voltage is not less than 1% per second: It should be noted that the power consumption devices at the enterprises are designed in accordance with the nominal value of the above-mentioned quality indicators of electricity, and even in this quality of power, the mechanisms do not lose their normal operation, and nominal quality indicators affect its quality. does not. In industrial enterprises, energy below the nominal value of the above quality indicators primarily affects the electrothermal devices, leading to changes in their temperature. It also causes a FIK change in the electric drive shaft to cause the lighting system to dim.

Nosinusoidality and asymmetry of voltage and current forms

The nosinusoidality of the network is characterized by the nosinusoidality coefficient of the voltage curve. The nosinusoidality coefficient should not exceed 5% in any consumer. Voltage asymmetry means that the amplitude or phase angular displacements of the phase or linear voltages are not mutually equal.

Changes in parameters such as rated frequency, rated sinusoid during operation of power grids in industrial enterprises are observed.

CONCLUSION DISCUSSION

Mathematical analysis of each quality indicator is checked on the basis of the

above indicators in accordance with the standards set for the quality of electricity in the state. Deterioration of voltage and current according to the requirements described in the studied power indicators leads not only to equipment failure, rapid wear of the connector, but also to the loss of information in the system, process failure.

In industrial enterprises, the deterioration of this figure can sometimes reach up to $ 100 million at a time. Low energy quality in industrial enterprises leads to inefficient losses in the transmission and consumption of electricity, and therefore this issue is still relevant today. Calculation of quality indicators in industrial enterprises It is very important to ensure that the simplicity of the calculation indicators is simple to ensure that it can be understood without any energy sector commentator. The fact that the indicators of energy quality control can be understood by the average manager allows you to quickly assess the quality control and, if necessary, take the necessary measures in a timely manner. Currently, many foreign companies offer specialized multimeters, spectrum analyzers, loggers, measuring systems and many other fruit monitoring tools to assess the quality of electricity, which can be used to analyze the quality of electricity in a short time from 24 hours to 12 hours. 'i adapted to present the results within seven days. In general, we can distinguish three types of electrical quality indicators in industrial enterprises according to measurement purposes:

> Express - examination of the power grid;

> Continuous monitoring of power quality;

> Inspection of the power grid in order to determine the causes of the decline in the quality of electricity supply in industrial enterprises.

Electrical quality control in industrial enterprises

Audit - Electrical network expertise should be a simple and inexpensive monitoring tool. The task of the audit is to identify stable anomalies. The audit is performed during a relatively short follow-up period (minutes to several hours). Monitoring is a much more difficult and expensive software solution. Distributed, as a rule, centralized management measures and information networks are monitored

Specialized firms licensed to carry out such monitoring will conduct an examination.

Advantages of modern devices in the study of electrical quality indicators in industrial enterprises

Harmonic analyzers

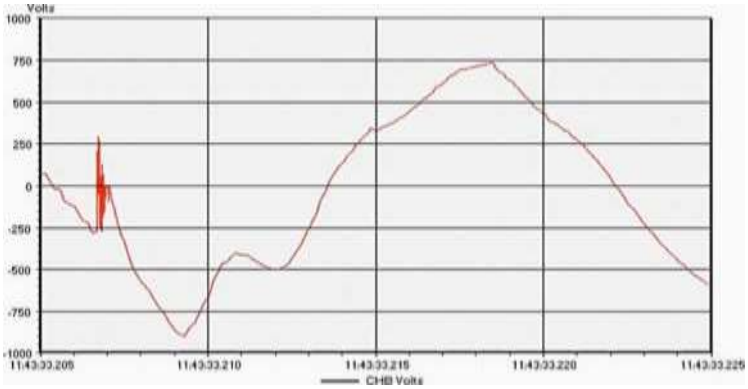
Harmonic meters are relatively simple instruments designed to measure and record harmonic distortion data. A counter with a waveform display on harmonic analyzers, voltage wires, and current probes parts are available. Some of your analyzers are manual and others are desktop-based. Some instruments show a picture of the voltage in the form of a wave and a picture of the harmonic disturbances during the odcha. In order for other instruments to record snapshots, as well as to obtain total

voltage calculations capable of continuously recording harmonic disturbances over time, such analyzers are calculated from the results of rest 20 and compared with the nominal value in the standards.

1- picture. Analyzer to detect transient impairment

Temporary distortion writers can take 2 to 4 million samples per second for analyzers. The higher sampling rates make the description of the transient event more accurate in terms of the amplitude and frequency content of the link. Both of these attributes are necessary to perform a temporal analysis. The amplitude of the waveform provides information about the possibility of damage to the affected equipment. Such Frequency Composition also gives us information on how your event is connected and how you can soften the link.

Once such data have been identified, the sensitivity of the equipment should be determined. For example, a 200-V peak pulse applied to a 480 V motor may have no effect on engine life; however, the same impulse transmitted to the process manager can lead to immediate failure.



2- picture. A transient current of 562 V with a frequency of about 200 kHz was observed.

Oscilloscopes - can replicate repetitive high-frequency waveforms or high-frequency interference in power and control circuits. The sampling rate of oscilloscopes is much higher than that of temporal distortion analyzers Oscilloscopes with a sampling rate of several hundred million samples per second are common. This

allows the instrument to accurately record repetitive noise and high frequency waveforms.

Data Transducers, Diagram Recorder - Sometimes power systems use data recorders and chart writers to record voltage, current, demand, and temperature data. Data recorders and chart recorders are slow-running devices that are useful for storing data in a stable state over a long period of time.

RMS counters — The term RMS is commonly used in power quality applications. The RMS value of the current or voltage works with an indicator that differs significantly from the main component of the voltage or current.

CONCLUSION

As a result of our studies, it became clear that due to the failure to control the quality of industrial enterprises in a timely manner, there are connections in various production processes, malfunctions in equipment. The reason for the lack of timely control is the lack of necessary equipment in research centers, the lack of qualified operational specialists in the implementation of control operations, the need for large funds for the analysis of the operating system. The following is recommended when controlling the quality of electricity in industrial enterprises

1. It is necessary to introduce measures to determine the quality of electricity in industrial enterprises on a regular basis on the basis of a certain plan.
2. The company has set an annual allocation of 10% to improve the quality of electricity and increase efficiency.
3. Providing research centers with modern necessary equipment for quality control.
4. Precise consideration of the consumer's convenient power load in the transmission of electricity
5. It is recommended to constantly monitor the verbal and usability level of power transmission and distribution devices

It should be noted that in the process of electricity generation, the processes such as transmission, distribution, delivery to the consumer are carried out simultaneously, which is a natural complexity and difficulty. Therefore, the development of iodine for efficient use in electricity does not always lose its relevance.

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