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Electrical load analysis in public utility building

***Abstract**. The paper presents the evaluation of the quality of electricity in a public building. The assessment was based on the Regulation of the Minister of Economy dated. May 4, 2007 on the detailed conditions of operation of the power system and the standard PN-EN 50160: 2010 - Characteristics of supplied voltage in public power networks. The analysis was based on actual measurements made with the Fluke 1760 electrical power quality recorder. The active, passive power and cos fi consumed by the building was the main focus of the analysis.*

Keywords: power quality, public building, active power.

Introduction

Electricity has gained the status of the most popular and most frequently used form of energy. The process of generation, transmission and use of electricity is fully mastered. Energy has become the object of purchase and sale. The main factor determining the price that the consumer must pay is of course the amount of energy consumed by him. However, the feature which determines its usefulness for electric receivers is the quality of it [1].

The best quality of electricity is one in which the voltage curve is uninterrupted and perfectly sinusoidal, and its frequency has a nominal value. The value of the rated voltage is equal to the value of the effective voltage. The perfect condition can't be achieved, so for each recipient sufficient parameters of the quality of electricity are determined, which do not adversely affect the work of the object. All deviations from the ideal are subject of testing and evaluation. The basic place of measurement, observation and testing is usually the point of connection to the power grid. The next measuring point is the point on the receivers' terminals.

Power quality is one of the most serious dilemmas in the modern world. It is predicted that in the near future, the vast majority of electricity users will have to face smaller or larger complications caused by the issue of energy quality.

Place of Measurement

The measurement of the quality of electricity was made in a public building. The tests were carried out in the low voltage switchboard of the public building for seven days in accordance with PN-EN 50160. The connection diagram of the analyzer in the switchgear is shown in Figure 1.

Figure 1 shows the general ideogram of the measuring system. The main component of the measuring system was the Fluke 1760 recorder. The device records continuous power quality measurements in a 10 minute measurement window. Voltage and current values, their total harmonic distortion THD deformation coefficients, and harmonics are recorded. Each measuring window calculates the effective values for a period of 20 ms, resulting in a total of 30,000 samples in 10 minutes. Maximum, minimum and average values from this dataset data are determined. Actual, passive and apparent powers, frequency, asymmetric coefficients are also registered. In addition, the recorder allows recording of 20 ms effective values and instantaneous events during the event.

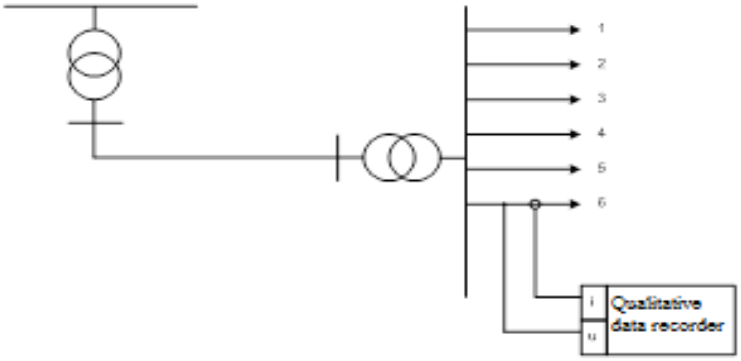

Fig.1. General schematic diagram of the measuring system (1,2,3…. energy user group).

Conclusion

On the basis of the power factor can be determined, which will be the size of the active power consumption. The object can be characterized by making a comparison in time and at times of day and week. Changes occurring in the facility testify to the nature of the examined object, which is a public utility building. Receipts that are installed on the object charge a specific power. By analyzing the object under study, can be assume what loads are installed on the building and what their cycle of operation is.

References

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