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# «Metrological Support of Innovative Technologies» ICMSIT-2020

«Using the new configuration of the current transformer as a safe  
current meter»

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of Innovative Technologies

# Problem statement

Normal operation of power systems cannot be achieved without solving the most important issue, which can be formulated as a reliable and safe measurement of electric current. For this purpose, an industrial current transformer is most commonly used, which has a number of significant disadvantages in operation. These disadvantages can be corrected by improving the design of the current transformer. This article presents a device of similar current transformer, provides results of research of electromagnetic field of industrial current transformer and current transformer with improved configuration. In addition, the results of experiments of the tested samples are given, which allow to speak about the possibility and preference of using similar design of current transformers for measurement of single-phase current of industrial frequency.



# Solution methods

Since it is not possible to completely eliminate the possibility of accidentally opening the secondary winding of an industrial current transformer, it is necessary to improve the current transformer design and make it impossible to open the secondary winding. This can be achieved by using an undivided conductive ring made of aluminum or copper as the secondary winding, and the measuring winding can be wound over or under the short-circuited ring. Due to the similar design of the short-circuited current transformer, the measuring winding can be in the open state without causing a production emergency.

A pattern of electromagnetic field distribution when examining the model of this sample in ELCUT software complex, which allows to model electric machines and transformers to obtain a picture of electromagnetic processes going on in them.

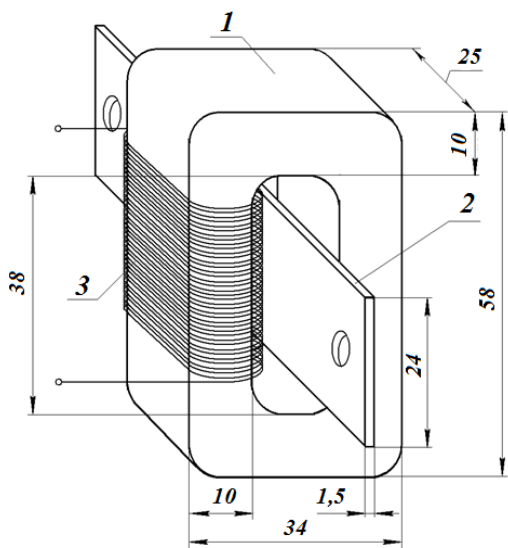


Figure 1. Transformer of Current. Test Sample

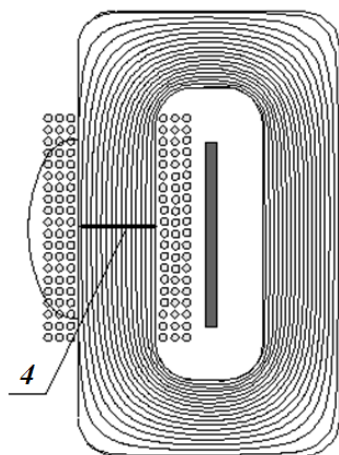


Figure 2. The distribution pattern of the magnetic field induction lines of the transformer of current.

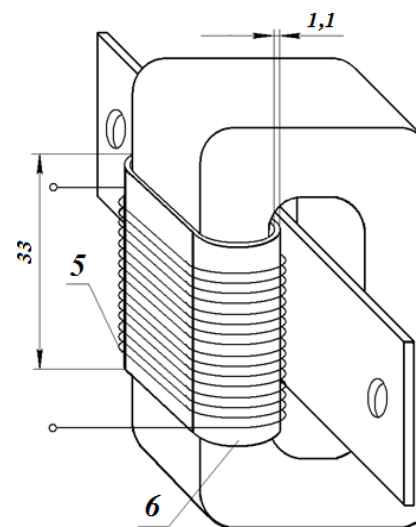


Figure 3. Transformer of current with short-circuited ring. Test Sample

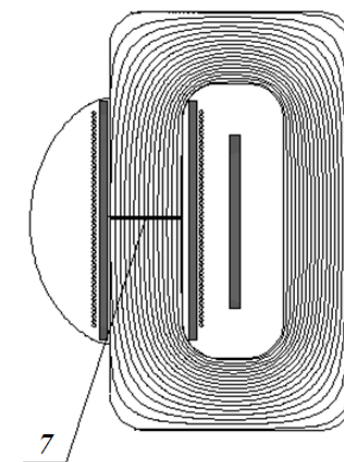


Figure 4. The distribution pattern of the magnetic field induction lines of the transformer of current with short-circuited ring

# Conclusions

Analyzing the obtained results of the electromagnetic field examination of the tested samples in the ELCUT software complex and experiment, it can be concluded that the use of a current transformer with a short ring, instead of an industrial transformer, will make the process of AC measurement completely safe, without reducing the accuracy of the measurement result. Similar short-circuited current transformer designs can be widely used in the industry both as a stand-alone current meter and as an integral part of intelligent measuring systems.

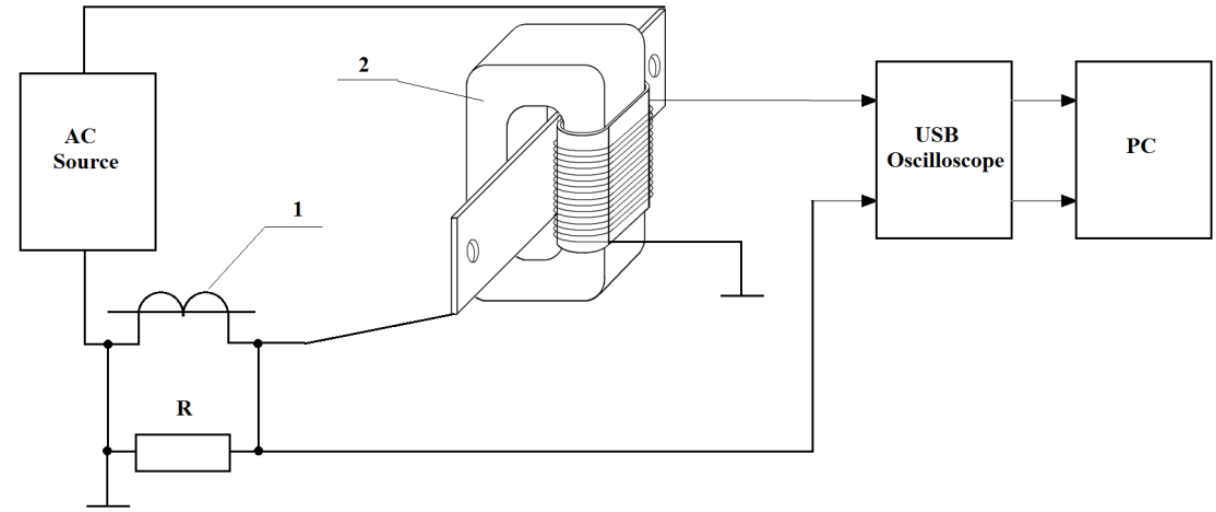


Figure 5. Experimental installation

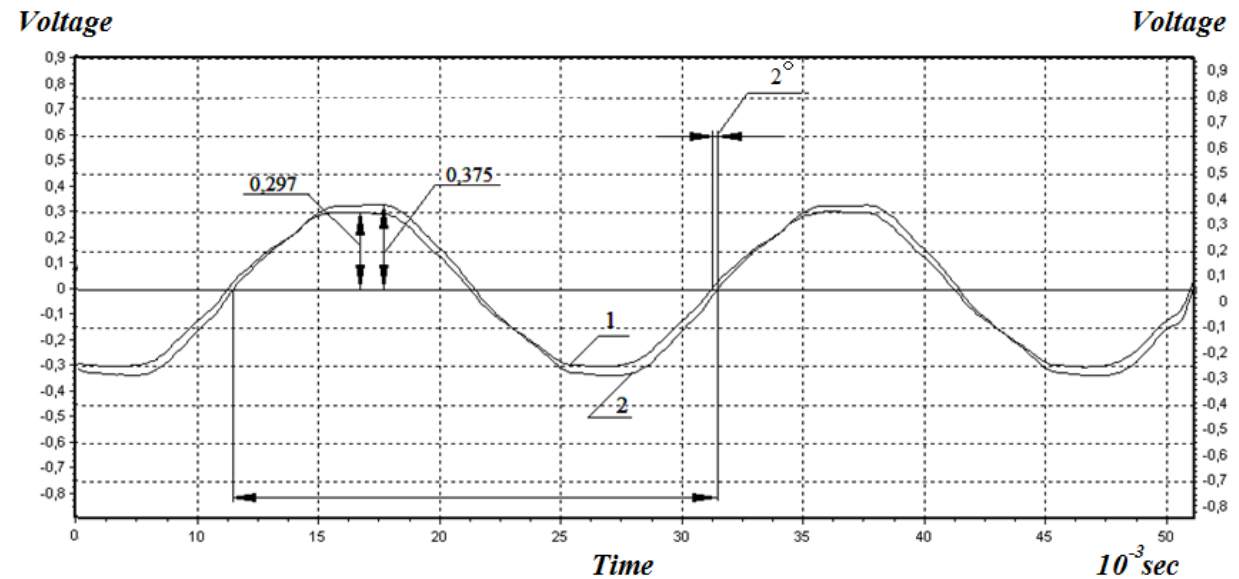


Figure 6. The result of an experimental study

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