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BENEFITS OF FIBER OPTIC CURRENT TRANSFORMER

Introduction. At the present stage of the development of high-voltage technology, classical methods of measurement based on the electromagnetic principles have reached the limit of their capabilities and cannot satisfy new requirements. They have arisen due to technological revolution of the last several decades. As noted in their work Zubia, Casado, Aldabaldetrek and others,

“Unimaginable technological advances in the area of information and communications technology (ICT), the electrical sector had turned into an anachronism using the technology of last century”. Therefore, modern development of electrical complexes and systems require the introduction of the latest designs of instruments and equipment. As a result, the so-called optical-electronic (OE) measurement methods make it possible to realize the requirements of consumers. They are based on the use of optical communication between the primary and secondary transducers of the measuring system. Such methods use a completely different, more promising approach, based on the use of the magneto-optical Faraday's effect. Most often, this effect realized in fiber optic current transformers (FOCT) used in combination with modern digital signal processing and data transmission technologies.

Currently, the development of the FOCT is produced by leading companies around the world. Such transformers are considered to be the next generation of transformers, because they eliminate defects of the analog transformers and meet all the necessary requirements.

Faraday's effect. Nowadays FOCT use the magneto-optical Faraday's effect, which is a fundamentally different promising approach.

Khairullin, Giniyatullin and Pashali, speaking of the magneto-optical effect, write that “In 1845, Faraday discovered a phenomenon that became one of the main steps in the development of optical current converters — the phenomenon of rotation of the plane of polarization of linearly polarized light in a constant magnetic field”, as in Figure 1.

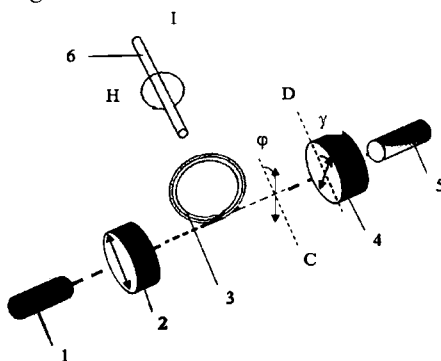


Figure 1 – Schematic diagram of the Faraday's effect

1 – laser diode; 2 – polarizer; 3 – Faraday's element (twisted optical fiber);
4 – analyzer; 5 – photodiode; 6 – electric current conductor

Benefits of FOCT. In comparison with conventional transformers, optical fiber ones are compact and lightweight, also they are easy to install. Another

advantage is flexibility of transformer. This is possible thanks to its insulation. Insulation is an essential element of electrical apparatuses and has a significant impact on both its design and operational reliability. Also they are fire and explosion proof. At the same time the sensor element is naturally decoupled from the voltage line. And there is minimal electrical interference on the signal line.

Conclusion. Based on these benefits it is safe to say that FOCT is the transformer which will be used all around the world because they eliminate defects of the analog transformers and meet all the necessary requirements.