COMPLEX FOR MEASURING CURRENTS AND VOLTAGES OF THE POWER SUPPLY SYSTEM OF THE ITER MAGNETIC COILS [[1]](#footnote-1)\*)

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The plasma confinement in the vacuum chamber of the ITER tokamak is carried out using a superconducting magnetic system consisting of 18 toroidal field coils (TF), 6 poloidal field coils (PF), 6 central solenoid modules (CS), and 9 corrective field coils (CC). The power supply of the coils is provided by the system, almost all components of which will be unique and designed specially for the ITER.[1]

For the fast and correct control of the superconducting magnetic system during its operation, as well as for the timely response of protective systems and equipment to emergency events, it is required to carry out fast, accurate and reliable control of voltages and currents in the power supply system of magnetic coils.

Due to the large scale and complex architecture of the magnetic coil power supply system, voltage and current control requires using of a large number of different measuring equipment, both mass-produced and newly developed for the ITER requirements. The number and variety of the measuring equipment entails the need to transfer a large amount of data synchronized with each other with frequencies up to 20 kHz (up to 100,000 measurements per second) and their processing. In addition, the peculiarities of operation under the ITER conditions impose additional requirements on the equipment used for resistance to direct current magnetic fields (up to 50 mT).

To ensure the control of voltages and currents in the power supply system of magnetic coils and taking into account the above requirements, the complex for measuring currents and voltages of the power supply system of the ITER magnetic coils has been developed.

The report presents the results of the development of the complex for measuring currents and voltages of the ITER magnetic coil power supply system, describes its composition and structure, explains the main architectural decisions made during the development of the complex, and also presents the testing results of both individual elements of the complex and the complex as a whole.

The speed and accuracy of measurements and the reliability of the complex are provided by a number of technical solutions adopted during the development. The compliance of the complex with the requirements is confirmed by the qualification and acceptance tests. The developed complex will be used in the ITER to ensure the control of currents and voltages in the power supply system of magnetic coils.

References

1. C. Neumeyer et al., ITER power supply innovations and advances, 2013 IEEE 25th Symposium on Fusion Engineering (SOFE), 2013, pp. 1-8.
1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/L/E/ru/JB-Popkov.docx) [↑](#footnote-ref-1)