CONTROL SYSTEM OF TOKAMAK ITER INTEGRATED SWITCH COMPLEXES [[1]](#footnote-1)\*)

DOI: 10.34854/ICPAF.2023.50.2023.1.1.229

Тereschenko E., Sokolova A., Manzuk M., Alekseev D., Gubanova N.

D.V. Efremov Scientific Institute of Electrophysical Apparatus, St. Petersburg, Russia, tereschenko@sintez.niiefa.spb.su

The plasma in the vacuum chamber of the ITER tokamak is held and controlled by strong magnetic fields, which are created by a magnetic system consisting of superconducting coils of various types, which are powered by powerful AC/DC converters. To control currents flowing in coils characterized by high inductance, the power supply system includes integrated switch complexes that provide output of energy stored in the magnetic field, both for protection purposes in the case of a quench, and for creation of a vortex electric field, necessary to initiate a plasma discharge.

The integrated switch complexes that are part of the ITER power supply system are a complex technical object in terms of control and diagnostics, and due to the large scale of the installation, it is also a distributed object. All this makes the development of a control and monitoring system a non-trivial scientific and technical task.

The ITER control system is divided into a multitude of subsystems that provide different goals and objectives, each of which consists of four levels of control:

* local level (equipment level);
* master level - combining devices of the same type into a single network;
* upper level - combining all devices related to this system into a single network;
* central level - combining all tokamak systems into a single network.

This report is devoted to the development and creation of a control and diagnostics system for integrated switch complexes that are part of the ITER tokamak superconducting coils power supply system at local and master levels. The report will present and substantiate the general requirements to the monitoring and control system for the integrated switch complexes of the ITER tokamak power supply systems, the main architectural concepts, and present the results of the development and testing of prototypes of both individual elements and the system as a whole.

All works are performed in fulfillment of obligations of the Russian Federation under a package of intergovernmental Procurement Arrangements of high-tech products to ensure the in-kind contribution of the Russian Federation to the ITER project.

1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/L/E/ru/IL-Tereshchenko.docx) [↑](#footnote-ref-1)