Brief review of the fast discharge unit Instrumentation and control system for Iter Poloidal field and central solenoid superconductive coils [[1]](#footnote-1)\*)

DOI: 10.34854/ICPAF.2023.50.2023.1.1.223

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The Poloidal Field/Central Solenoid (PF/CS) Fast Discharge Units (FDUs) are intended for protection of PF/CS superconductive coils by extracting the energy stored in the magnet system in case of a quench or other abnormal events, which could potentially damage the coils or power equipment. It will be provided by opening the coil current circuit by normally closed-circuit breakers, thus diverting the current into the discharge resistors.

The PF/CS FDUs operate in the Coil Power Supply System (CPSS) of the PF/CS superconductive coils. Twelve FDUs protect six CS coils (CS1U, CS1L, CS2U, CS2L, CS3U, CS3L) and six PF coils (PF1 – PF6). Each FDU consists of a Current Commutation Unit (CCU) and discharge resistor for dissipation of energy extracted from the coil magnetic field (Fast Discharge Resistors, FDR).

The Instrumentation and Control (I&C) System is an integral part of PF/CS FDU and is intended for control over components forming part of FDU, when performing protection of the PF/CS superconductive coils.

The PF/CS FDU I&C System is separated into two parts: Conventional and Interlock. Conventional I&C is necessary for data transition and control, while the Interlock I&C is intended for CPSS equipment protection. The Local Control Cubicle (LCC) comprises the control apparatus forming part of the Conventional I&C and Interlock I&C.

The diagnostic hardware provides information for self-protection function of FDU and makes it possible to limit the failures and reduce the frequency of their occurrence. The hardware provides monitoring of the power equipment and transmits the information on functioning of the equipment to the local system controllers [1].

This article describes the functions, architecture and design of the PF/CS FDU I&C System.

References

1. A.B. Gromov, et al., 2020 J. Phys.: Conf. Ser. **1507** 072023
1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/L/E/ru/IT-Gromov.docx) [↑](#footnote-ref-1)