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CONTROL OF THE SUPERCONDUCTING MAGNET POSITIONED ON THE DN-12 DIFFRACTOMETER OF THE IBR-2 REACTOR

A Helmholtz coil-like superconducting magnet with a maximum field of 4.77 T at a current of 300 A using a material with high-temperature superconductivity (HTSC) has been produced for the DN-12 diffractometer of the IBR-2 reactor in the Department of the Spectrometers Complex of FLNP. The magnet cryostat possesses a horizontal shaft for loading the high-pressure chamber that is introduced into the area of high magnetic field. The temperature of the high-pressure chamber can be varied using an electric heater in the range of (3.6 -150) K and the chamber is cooled using a closed-loop cryocooler as part of the cryostat insert that is introduced into the shaft together with the high-pressure chamber. The temperature of the magnet windings ranges from 20 to 40 K and is maintained using a closed-loop cryocooler.

The equipment bound in the system that controls the magnet, magnet current source, temperature controllers, cryostat vacuum measurements, the pumping system control –vacuum maintenance and compressor control of both cryocoolers are discussed in the report. The logical scheme of this system operation is considered as well. The equipment of the superconducting magnet environment provides such magnet parameters as magnetic induction, temperature of windings and current leads in the cryostat. The core of the system is the DANFYSIK current source and two cryocoolers. The sequence of switching on all units of the environment is implemented in such a way as to prevent the magnet equipment from operating outside the safe temperature range and to prevent its inadvertent transition to the regular state, in this case, emergency current removal from the HTSC coil is provided.

Section

Energy and materials science (Section 2)

Primary authors: Mr CHERNIKOV, Alexandr (FLNP JINR); ALTYNOV, Alexey (JINR); Mr RUTKAUSKAS, Anton (FLNP JINR)

Presenter: Mr CHERNIKOV, Alexandr (FLNP JINR)

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