

# Preliminary design on power supply system of superconducting test device based on long pulse signal

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To meet the requirements of continuous improvement of long pulse parameters, it is necessary to build a high-power converter power supply system, and optimize and analyze the power supply system based on the previous EAST (Experimental advanced superconducting Tokamak) and ITER (International Thermonuclear Experimental Reactor) fusion devices. This paper takes the power supply system of CRAFT (Comprehensive Research Facility for Fusion Technology) fusion device as the research object, and studies the performance optimization of various equipment from the perspective of adapting to long pulse. The converter power supply system is mainly composed of high-voltage AC switchgear, converter unit, and isolation network of combined converter to realize various operation modes, converter power control system and protection system. In this paper, the main converter unit is designed, including the calculation of three winding phase-shifting rectifier transformer, the structure analysis of thyristor converter, the parameter research of DC reactor, etc. The results have the characteristics of low impedance, high efficiency and stability, and can ensure the stable output of long pulse. The research in this paper provides an urgent research, development and testing platform under extreme conditions for the future research, development and testing of high-power fusion, special power supply and DC switchgear.

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