DESIGN STUDY OF AN AC POWER SUPPLY SYSTEM IN JT-60SA

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In the initial experimental phase of JT-60SA, the plasma heating operation of 30MW-60s or 20MW-100s is planned for 5.5 MA single null divertor plasmas. To achieve the above plasma operation, AC power source of the medium voltage (18kV) has to provide ~7 GJ in total for the poloidal field coil power supplies and additional heating devices such as Neutron Beam Injector (NBI) and Electron Cyclotron Radio Frequency (ECRF). Figure 1 shows the latest design example of AC power supply system, and the presently available devices including two Motor-Generators are reused here as much as possible to make it cost effective. The magnet coil power supplies consist of superconducting Toroidal / Poloidal magnetic Field Coil Power Supply (TFCPS / PFCPS), Fast Plasma Position Control Coil Power Supply (FPPCCPS), Resistive Wall Mode control coil Power Supply (RWMPS), and Error Field Correction Coil Power Supply (EFCCPS). As a basic concept of this design option, the AC power supply system of the NBI and the all coil power supplies are connected to the reused Motor-Generators because these has large load fluctuation during plasma operation. While, the TFCPS and the ECRF are directly connected to the commercial power grid.

The proposed AC power supply system of JT-60SA was estimated from view points of available power, and harmonic currents using "PSCAD/EMTDC" code based on the standard plasma operation scenario during the initial experiment phase, and it was confirmed to be acceptable. In addition, the conceptual design of the upgraded AC power supply system for the ultimate heating power of 41MW-100s in the extended experimental phase will be mentioned.

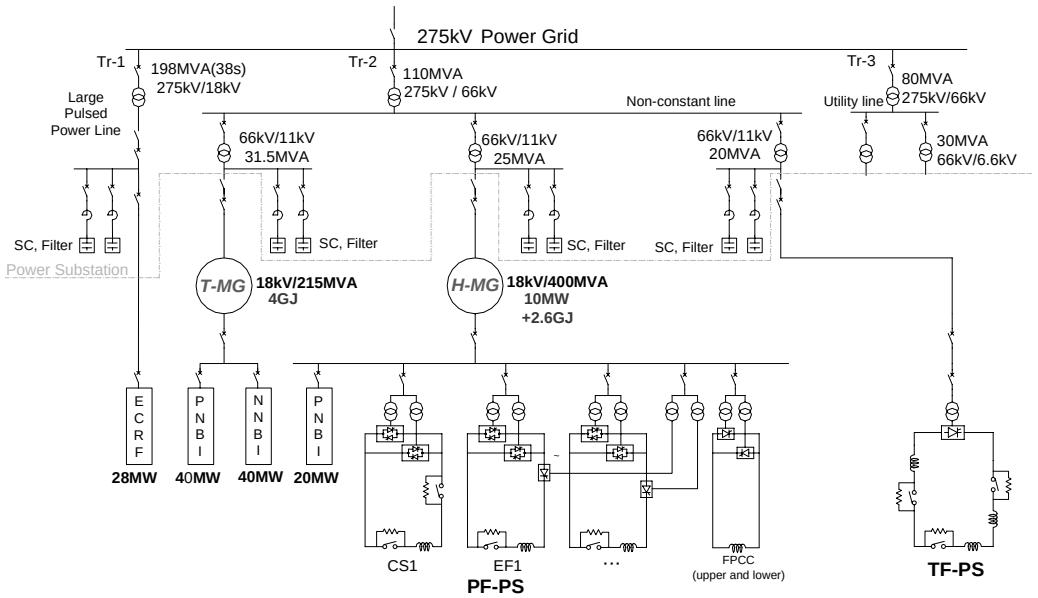

Figure 1: The proposed AC power supply system in JT-60SA (Initial experimental phase)