

**A REACTIVE POWER COMPENSATION AND
HARMONICS REMOVAL OF SUPERCONDUCTING
NUCLEAR FUSION DEVICE THROUGH TSC BASE
MASSIVE RPC & HF SYSTEMS**

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The KSTAR(Korea Superconducting Tokamak Advanced Research) device needs a large pulse power to supply to a superconducting magnet power supply(MPS) and a heating device to generate plasma and restrict plasma.

When the MPS(Magnet Power Supply) was operated, because a reactive power is generated, This factor induces voltage drop of the KSTAR electrical power system. Also, harmonics of specification degree increases and causes voltage distortion. These factors offers cause that deteriorate electric power quality of the KSTAR electrical power system. Especially, The PF(Poloidal Field) MPS is the device which affects of the worst in the KSTAR electric power system.

The PF MPS that supply a large dc power to the PF coil is generated a reactive power above 95% of total used power, and also the PF MPS that is the electricity conversion device to convert AC current to DC current is generated harmonics ($h=12n+1$:11th, 13th, 23th, 25th....etc) because of the PF MPS character that supply a large current dc power to the KSTAR by 12-phase pulses operating method. A reactive power and harmonics that is generated in the PF MPS can cause serious impact to the KSTAR electric power system and other device. Therefore, We must install the RPC(Reactive Power Compensator) & HF (Harmonic Filter) Systems that can make reactive power compensation and harmonics removal at the same time for the KSTAR electric power system stabilization. So, We installed by the MSC(Mechanical Switthed Capacitor) base RPC & HF Systems in 2008, and could compensate reactive power and remove harmonics. however, We had the defect which switching speed is delayed because the MSC base RPC & HF Systems do to act(on/off) the condenser bank by mechanic switching. in 2009, We installed and drove the TSC(Thyristor Switthed Capacitor) base massive RPC & HF Systems that the switching speed is fast to supplement the MSC base RPC & HF Systems's defect. in the result. Because the TSC base massive RPC & HF Systems acted condenser bank on/off by quickly switching of thyristor.

We compensated reactive power in BLIP section (Section that current value decreases instantaneously) and Zerocrossing section (Section that current value changes from (+) to (-) rapidly) also, removed harmonic when PF MPS was operated In this paper, We wish to discuss about the electric power quality improvement result of the KSTAR electric power system and verify about the TSC base massive RPC & HF Systems efficiency that we install for stabilization of the KSTAR electric power system at the KSTAR experiment in 2009.