Contribution ID: **152** Type: **Poster**

Fri-Af-Po.02-05: Long-term reliability evaluation of high voltage signal conditioners for ITER superconducting magnets during plasma operation in the KSTAR Tokamak

Friday, 4 July 2025 14:00 (2 hours)

Quench detection is critical to protect superconducting coils, especially in fusion superconducting magnets, due to enormous energy. A quench event can result in significant damage to fusion superconducting magnets. A High Voltage Signal Conditioner (HVSC) designed for quench voltage detection in the ITER superconducting magnet system has been developed collaboratively by the Korea Institute of Fusion Energy (KFE) and JH Engineering. Various types of HVSCs for ITER magnets and feeder systems were successfully designed, fabricated, and tested under high-voltage conditions and external magnetic fields simulating the fusion tokamak operational environment. However, long-term tests under actual tokamak plasma operation is essential to validate their reliability prior to deployment in ITER. Four types of HVSCs were installed and integrated with quench detection voltage taps of the Korea Superconducting Tokamak Advanced Research (KSTAR) superconducting magnets and bus lines. The long-term reliability tests of HVSCs were conducted during the 2024-2025 KSTAR campaign. The performance and reliability of the HVSCs were evaluated by comparing the recorded data with that of the KSTAR quench detection system

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Session Classification: Fri-Af-Po.02 - Quench Detection and Protection III