

QUENCH PROTECTION SYSTEM FOR THE KSTAR SUPERCONDUCTING TOROIDAL FIELD COIL

D. K. Lee, J. H. Choi, J. K. Jin, S. H. Han, J. D. Kong,
C. H. Kim, S. L. Hong, Y. S. Kim and M. Kwon
*National Fusion Research Institute (NFRI), Daejeon 305-333,
KOREA*

H. S. Ahn, G. Y. Jang, M. S. Yun, D. K. Seong, Y. H. Kim, Y.
W. Lee and H. S. Shin
*POSCON Corporation R&D Center, 101 Korea Techno
Complex Building, Korea University, Seoul 136-713, KOREA*

A compact and unique design of the integrated quench protection (QP) system for the high-current superconducting magnet coils has been fabricated and tested for the toroidal field (TF) coil system of the Korea Superconducting Tokamak Advanced Research (KSTAR) device. The QP system is capable of protecting the TF superconducting magnet coils, which consist of 16 identical coils serially connected with a stored energy of 495 MJ at the design operation level, 35.2 kA per turn.

Since the power supply for the TF coils can only ramp up or maintain the coil current, the design of the QP system included two features. The first is a basic fast discharge function to protect the TF magnets by a dump resistor circuit with a 7 sec time constant in case of coil quench events. The second is a slow discharge function with a time constant ~ 360 seconds for a daily TF discharge or for a stop demand from the tokamak control system.

The QP system has been tested up to 40 kA with a short circuit and up to 32 kA with superconducting TF coils successfully in the second campaign of KSTAR. This paper will describe characteristics of the TF and the QP systems and test results of the second plasma experiment of KSTAR in 2009.