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# Mon-Mo-Po1.01-12 [11]: Cenceptual Design and Performance of Quench Detection System for Super High Field Magnet Using Multi Receivers via Wireless Power Transfer Technology

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The superconducting wires have been developed for high field magnet, transformers, motors and so on. The quench detection and protection system are essential for safety operations of the HTS facilities. The high voltage signal conditioner (HVSC) method is generally used for the quench detection and protection, however, especially for high voltage operation magnet such as international thermonuclear experimental reactor (ITER) magnet (56 kV, DC), it is difficult to apply to HVSC method due to the risks in terms of high voltage sparks. As well as, the power supply for HVSC should be isolated since the super high field magnet such as ITER magnets, which is supplied by 15 MA, generate about 10 T (tesla) strong magnet. To solve these problems, insulation resistance of power supply should be larger than 500 MΩ; a lower resistance can affect the common-mode voltage of the differential amplifier in the HVSC system. From these reasons, our research team, the wireless power transmitter (WPT) system has been considered as one of reasonable options to solve insulation resistance obstacles since WPT system can transfer power through any non-metallic media between antenna (Tx) and receiver (Rx) coils. Now, the one wireless power system generally supplies operating power for one differential amplifier in the HVSC. Practically, numerous differential amplifiers would be installed in the high field magnet to detect and protect magnet system. From this reason, in this study, authors described the conceptual design and fundamental performances of quench detection system for super high field magnet using wireless power technology. Especially, the thermal distribuitons of antenna and receiver will be evaluated. As well as, the number of wireless power supply including insulation resistance can be reduced by multi resonance receiver under the 100 kHz with 3kW RF generator.

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