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## P2.085 Type Tests of Counter Pulse Circuits for the ITER Fast Discharge Units

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The ITER magnet system comprises 30 main superconductive coils, which will create steady-state and slowly varying magnetic fields with a total energy up to 50 GJ. The fast protective discharge of this energy in case of a quench (superconductor-to-normal transition) is provided by closing the coil current circuits with the help of protective make switches (PMS) and inserting discharge resistors (DR) into these circuits by opening circuit breakers forming part of fast discharge units (FDU).

Two FDU systems have been designed, namely, TF FDU for protection of the toroidal field (TF) coils with constant current direction and PF/CS FDU for the poloidal field (PF) coils and the central solenoid (CS) modules, where the current direction and magnitude might vary during operation cycles.

One of the main parts of each FDU is a counter-pulse circuit (CPC) consisting of one or two counter-pulse units and a charger. The CPC units are intended to provide a current pulse in vacuum interrupters forming part of the two-step FDU circuit breaker in the direction opposite to the coil current direction. The TF FDU includes two unipolar CPC units (CPC-U) with output circuits connected in parallel with each other. The PF/CS FDU has one bipolar CPC unit (CPC-B), where the direction of output current pulse can change depending on the direction of the coil current.

The paper describes the designs of two types of the CPC units and the results of the type tests carried out on their full-scale prototypes. The successful results of the tests demonstrated the working efficiency of the CPCs, confirmed their compliance with the design requirements and served as the basis for beginning of manufacturing of these devices to be delivered to the ITER Site.

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