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P2.081 Reactive power compensation for the pulsed power supply of ASDEX Upgrade

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One of the biggest challenges for a fusion reactor with magnetic confinement is the controlled removal of the heating power. ASDEX Upgrade (AUG) is one of the leading experiments in this area and investigates integrated solutions that combine high heating power and wall materials suitable for reactors. To increase the normalized output power towards the values intended for ITER and DEMO, the present AUG program combines the rise of the central heating power by ECRH, ICRF and NBI with an enhancement and optimization of the power supply installation.

To ignite the plasma and to ramp up the currents in the poloidal field coils, high DC voltage is required. During plasma flattop the ohmic losses of the copper made coils have to be covered, only. This part-load operation results in high reactive power demand of the high current converters. The power supply of AUG relies on flywheel generators with limited power and energy. To optimize the energy consumption and to reduce the current load to the generator, a 90 Mvar static reactive power compensation (RPC) has been installed at flywheel generator EZ4. In a first step, 30 Mvar of reactive power have been connected to the generator in order to check the system stability of a converter driven, self-excited generator. After successful testing, the RPC has been extended and operates now with 2x 15 Mvar and 2x 30 Mvar switched compensation modules. The paper describes the motivation and effort to increase the pulse power capabilities of AUG. It provides details on the design, installation, commissioning and the present state and experimental findings of the RPC system.

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