

FINAL TEST OF THE W7-X CONTROL COILS POWER SUPPLY AND ITS INTEGRATION INTO THE OVERALL CONTROL ENVIRONMENT

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In order to be able to vary the magnetic configuration of WENDELSTEIN 7-X (W7-X) at the plasma edge and allow sweeping of the power across the divertor target plates 10 „control coils“ are installed inside the plasma vessel behind the baffle plates of the divertor. The coils are made of a hollow copper profile with eight turns each. The dimensions of the coils are 2,05 m x 0,35 m x 0,35 m with a three dimensional shape to fit into the narrow space between the baffles and the wall of the plasma vessel.

Each of the ten coils is supplied by independent power supplies each providing bi-directionally a direct current of 2500 A with high accuracy and low ripple.

To allow sweeping the power deposition from the plasma across the target plates the power supplies provide an alternating current of up to 625 A with frequencies up to 20 Hz which is synchronised between the ten supplies in order to maintain the symmetry of the magnetic field.

The total output current of a power supply is a superposition of a direct current and an alternating current, where both parts have to be independently adjustable.

JEMA, Spain provided the complete set of power supplies which are based on 10 independent four-quadrant power supplies with a link rectifier and includes a cooling water unit, a dedicated distribution and a central control and visualization system. All ten power supply units and auxiliary systems have meanwhile been installed and finally tested at the W7-X site in Greifswald.

The paper focuses on the results of the final tests and measures to integrate the power supply system to the overall control system including the central PLC and PC's for experiment control, data acquisition- and security systems.