THE POWER SUPPLIES FOR THE GLOW DISCHARGE ELECTRODES IN WENDELSTEIN 7-X

Th. Rummel[1], F. Füllenbach[1], G. Böhm[2], W. Kaesler[2], R. Burek[2]

[1] *Max-Planck-Institut für Plasmaphysik, Euratom Association, Wendelsteinstr. 1, D-17491 Greifswald*
[2] *PPT Puls-Plasmatechnik GmbH, Feldstr. 56, D-44141 Dortmund*

Corresponding author: thomas.rummel@ipp.mpg.de

The conditioning of the Wendelstein 7-X (W7-X) plasma vessel will be done by glow discharges. Ten electrodes are placed inside of the vessel. Due to the three dimensional geometry and the variation from a triangular cross section to a beans cross section the conditions for the ignition and the stabilization of a glow discharge can vary from one electrode to the other electrode. It was therefore decided to supply each electrode by one power supply. For the ignition a voltage of up to 3 kV is necessary and during the glow discharge a current of up to 3 A is expected per electrode. The ten power supplies are individually controlled by a PLC based control system. This control system is a major part of the overall glow discharge system, because it has to allow the combination of two or more power supplies to groups, which can be controlled in a similar way. The glow discharge is planned to run up to a week in steady state mode. This requires a sophisticated monitoring system of the parameters of the power supplies and the implementation of a proper matrix of reaction after failures. This feature is a second mayor part of the control system. Due to the high voltages during the fast discharge the access to the experimental hall will possible be restricted. A location outside of the experimental hall was therefore selected for the power supplies. This allows the control also during the discharge. One aim of the Wendelstein 7-X control system is the remote control of all activities from the W7-X main control room. The glow discharge power supply control has to allow such operation and special procedures for exchange of control rights were implemented.
For the tests of the power supplies a dummy load was developed. It allows tests with full power to check the performance of the power supplies independently from the electrodes.
All power supplies and the control system are integrated into three 19 inch cabinets. Another cabinet contains all necessary switches of the grid distribution and the control system.
The system was developed, manufactured and tested by the Puls-Plasmatechnik GmbH in Dortmund, Germany. The final tests were carried out in IPP Greifswald.
The paper describes the layout of the system and the components in detail. The structure and the functions of the control system will be explained. Important tests which were carried out at the manufacturers site as well as in IPP during the acceptance tests will be presented.