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Basic design and results of Regulated high voltage power supplies utilized for heating systems at IPR for SST-1

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Regulated high voltage power supplies (RHVPS) at an 80kV/10 MW level are designed, developed in-house and patented by Institute for plasma research (IPR) and are being utilized for different heating systems within steady state tokomak (SST-1). These are main power sources for NBI, LHCD, ECRH and ICRH heating systems for running an SST-1.
In this presentation, different subparts of these RHVPSs like power electronics, power supply control and multi megawatt transformers are described in brief. A procedure of commissioning and erection issues for these power supplies with their dynamic load like accelerator, gyrotron and klystron are also discussed. Fast turn off capabilities (2 micro Sec) and actual short circuit tests (wire burn test for 10 J fault energy) with test results are shown to certify their capabilities, since these type of power supplies must have these characteristics for fail safe operation of their dynamic loads which might have breakdowns within themselves. These HVPSs were operated with several loads e.g. a large ion source for NB, a Klystron and a Gyrotron. All loads have different dynamics but the HVPS was found to be capable to cater to all. Results of RHVPS testing with dummy load and with actual heating systems (NBI, LHCD, ECRH) are presented with reference to their load characteristics.

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