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DEVELOPMENT, IMPLEMENTATION AND COMMISSIONING OF DATA ACQUISITION & CONTROL SYSTEM FOR TWIN SOURCE

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Twin Source - An Inductively coupled two RF driver based 180 kW, 1 MHz negative ion source experimental is setup at IPR, Gandhinagar with the objective of understanding the physics and technology of multi-driver coupling. The data acquisition and control system (DACS) for TS experiments involves development of control core program, Control GUI, acquisition program and front end signal conditioning electronics; testing, implementation & commissioning for its safe, reliable and successful operation. The TS-Control architecture is similar to ITER CODAC Core system with some technical features from ROBIN DACS .

The control system consists of three parts (i) Master control system(S7 400PLC), (ii) Remote I/O (ET200S) for vacuum & cryo and (iii) (ET200M) for water cooling system, Extraction and acceleration power supply and (iv) S7 300 PLC for RF generator control. The optical PROFINET and PROFIBUS is used between the master control system and the remote I/O station and S7 300 PLC respectively. For the development of control core program, Siemens step 7 software is used, whereas, CODAC core system 4.0 is used for SCADA function . For the data acquisition purpose, National Instrument (NI) PXIe system and NI 6259 digitizer cards have been consider, following ITER fast controller catalogue. ITER PCDH (plant control design handbook) guidelines are not followed fully in TS-DACS. In CODAC core system fast acquisition function is not user-friendly. The LabVIEW real time software has been used for real time data acquisition application, though it is not a part in the PCDH fast controller catalogue. There are approximately 200 nos. of control channels and 152 nos. of acquisition channels to perform complete control of the system. All the signals coming from floating at high potential (˜50 kV) sub-systems (like ion source) are connected to the TS-DACS system through fiber optic (FO) link, developed in-house which provide electrical isolation and better noise immunity. The 180 kW RF generator has been commissioned through the TS-DACS.

This paper discusses about the design, software development, implementation strategy, commissioning of the TS-DACS along with some of its operational test results of subsystems linked with twin source experiment.

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