

Proposal for upgrades of the control and data acquisition system of the Negative Ion Source NIO1

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Power efficiency of neutral beam injectors for DEMO reactor and other fusion applications critically depends on components, including a multiaperture negative ion source. Its optimization promotes the research of a rich variety of physical issues, for which reduced-size model sources are of great help. The ion source NIO1 (Negative Ion Optimization 1) built in Consorzio RFX aims to provide such model, and a versatile test bench for innovations and for simulation code validations. The modular design of source and accelerator column allows for replacement of improved parts and electrodes, and many ports are provided for beam diagnostics and pumping. Electrode design and power supplies are rated for a nominal beam current of 130 mA at -60 kV, divided into 9 beamlets with multiaperture extraction electrodes; a 2 MHz radiofrequency generator can provide up to 2.5 kW power in continuous regime.

This poster describes the NIO1 control and data acquisition system, with a special consideration on the indications arisen during its operation. The details of the two main versions of the control software will be presented, together with the operational differences between the two releases. An upgrade of the control and data acquisition system is proposed to increase the reliability and the scalability of the device. Subsystems will be distributed and organized following a concurrent scheme. Programming changes will be shown together with their impact on the system. In this new version the unique server dedicated to the overall control will be split into several separated clients and servers, each one dedicated to a specific subsystem. All data will be stored in a hierarchical database, and summary data will be archived in a relational database. External users will be able to visualize elaborated data and interact in real time. In addition, the websocket communication standard protocol will be adapted to NIO1.