8 - 45 Design of PREF's Injection and Extraction Control System

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The Proton Radiation Effect Facility (PREF) is an applied ion accelerator designed and constructed by the Institute of Modern Physics, Chinese Academy of Sciences, which is used for proton displacement damage effect simulation test. The high voltage electrostatic deflector injection and extraction system ensures that the beam can be accelerated and extracted by the synchronous ring.

PREF uses a high-voltage electrostatic deflection plate as the beam injection and extraction device. The deflection plate control system is divided into two parts: motion control and DC high voltage power supply control, as shown in Fig. 1.

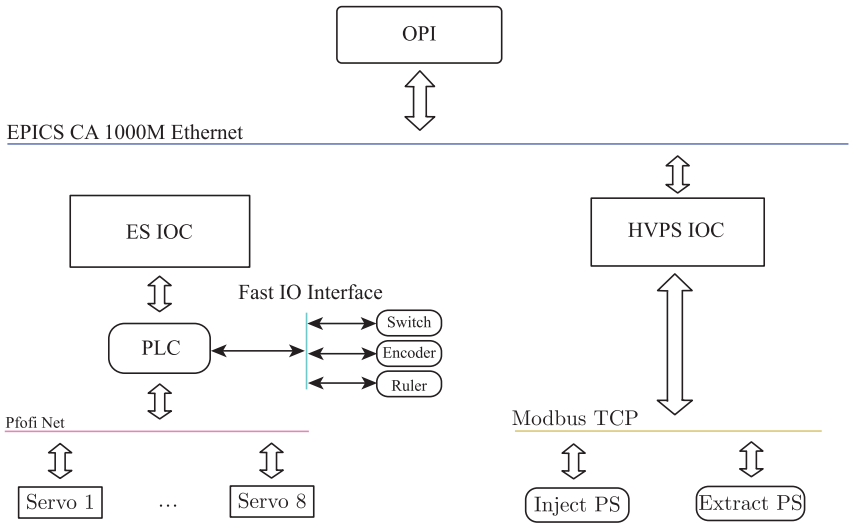

Fig. 1 (color online) Structure of deflection plate control system.

Motion control is realized by controlling 8 servo axes (4 for each deflector) to achieve high precision control of the distance between the negative and positive plates of the deflector plate, and collision protection, deformation protection and gear slip detection are realized by real-time data of the read back stroke switch, external encoder and grating scale. The hardware part is composed of Linux industrial computer, PLC, servo drive, servo motor, travel switch, external encoder and grating ruler, and the software part consists of PLC program, IOC and OPI. Dc high voltage power supply control realizes beam deflection by loading high voltage electric field on the deflection plate. The hardware part is Linux industrial computer, and the software part is OPI and IOC.