

The Operation, Control, Data Acquisition System of ASDEX Pressure Gauge for Neutral Pressure

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The Bayard-Alpert (BA) type hot cathode ionisation gauge is widely used to measure neutral pressure precisely in vacuum system below 10^{-3} Torr pressure. Neutral pressure measurement in magnetic confinement fusion experiments is quite challenging for standard BA type gauge due to higher pressure limitation and its ionisation is affected by high magnetic and electrical fields. To overcome above limitations, A special hot cathode ionisation gauge, named ASDEX Pressure Gauge (APG) system has been developed by G. Haas at the Max-Planck-Institute, Germany [Haas]. The APG system works in high magnetic field upto 6 Tesla and high temperature plasma environment with broad pressure measurement range from 10^{-1} to 10^{-6} mbar with fast response (<10 msec) and good noise immunity.

For ADITYA Tokamak, A customised system of operation, control and data acquisition for standard APG system has been designed and developed to measure real time neutral pressure during high temperature plasma discharges. The developed system can achieve synchronous control of gauge controller using GPIB and data acquisition of ion and emission current of gauge head using PCI based data acquisition module. Initially, the APG calibration with standard BA type hot cathode ionization gauge had been carried out on the test setup of low magnetic field and ultra high vacuum system with different gases like H₂, Ar, He. For APG calibration in various pressure range of different gases, precise gas feed control system has been developed using controller based hardware and LabVIEW software. After successfully testing and calibration, the APG was installed on ADITYA tokamak and calibrated under high magnetic field of ADITYA Tokamak. The developed APG control system has been configured to set the gauge parameter before the plasma discharge and acquired real time analog signal acquisition using simultaneous sampling by analog to digital convertor (ADC) during plasma discharge. The acquired raw data and processed real time pressure measurement gives valuable neutral density information to tokamak plasma.

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