

Subsystems control on the COMPASS tokamak

T. Pereira^a, F. Janky^b, B. Santos^a, P. Cahyna^b, M. Hron^b, J. Sousa^a and
H. Fernandes^a

^aInstituto de Plasmas e Fusão Nuclear - Instituto Superior Técnico, 1049-001 Lisbon, Portugal

^bInstitute of Plasma Physics AS CR, Association EURATOM/IPP.CR, 182 00 Prague, Czech Republic
tpereira@ipfn.ist.utl.pt

The COMPASS tokamak reinstalled recently at IPP Prague have been completely refurbished concerning the control of the vacuum and glow discharge (GDC) subsystems. This have been realized employing embedded microprocessors, programmed in C language.

This control system benefits from all the advantages of embedded devices: reduced price, no operating system failures, immediate bootup upon power on and watchdog capabilities.

The embedded device controls a set of commercially available I/O multiplexers through a RS485 bus. These multiplexers control the pumps, valves, flow controllers, etc.

The firmware for the vacuum system includes safety measures to protect the turbo molecular and roots pumps in case of leakage into the chamber or other increase in chamber pressure or malfunction of the primary pump. It also includes an automatic progression mode to take the chamber from atmospheric pressure condition (pe. after opening the chamber) to high vacuum. The vacuum control system operates 24/7 unattended, in high or low vacuum condition, thus assuring the safety of the pumps and overall machine.

The glow discharge system encompasses the control of valves, pumps, mass flow controllers and vacuum gauges. Unlike the vacuum system, the gdc system is not operated 24/7 and, thus, the microprocessor firmware doesn't implement safety measures for this system, nor automatic operation. Instead, the embedded controller must be actuated by a human operator.

The embedded microprocessors for both the vacuum and GDC systems receive orders from a hub PC installed in the control room, implementing a protocol developed with this task in mind. This link is done via an optical serial line, thus respecting the galvanic isolation of the tokamak hall. On this PC, a FireSignal node manages the sub-systems over the intranet, but it can also be operated locally, for debugging purposes.

The subsystem control is now working and has proven to be a reliable solution for the machine operation and safety.

IAEA-TM2009/94

Number of words in abstract: 308

Keywords: subsystem - control - compass - tokamak

Technical area: Machine control

Special session: Not specified

Presentation: Poster presentation preferred