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First version of the W7-X Fast Interlock System

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The central safety system (cSS) of W7-X consists of two parts. The safety related PLC with its corresponding periphery, such as sensors and actors, fulfills the requirements of occupational safety and ensures basic investment protection. The reaction time from the signalization of dangerous faults to the initiation of protection measures like W7-X emergency stop or media shut-off is in the range of some 100 ms. Because this is not sufficient to protect components in the plasma vessel in case of overloading by plasma heating, a fast interlock system was implemented. In the first operation campaigns of W7-X, with limited energy input, only a local fast interlock of the ECRH (using stray radiation probes) has been applied. Now, the central fast interlock system (cFIS) as part of the cSS and local fast interlock systems (LFIS) in several heating systems have been installed. Together with a set of safety relevant diagnostics, this system is able to react to dangerous situations within the few ms-range.

The paper describes the system design, hardware components as well as the software implementation in detail. First results, which are obtained during the operation campaign 1.2b in summer 2018, are outlined.

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