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## Full coverage infrared thermography diagnostic for WEST machine protection

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The WEST platform aims at testing ITER like W divertor targets in an integrated tokamak environment. To operate long plasma discharge, the IR thermography is required to monitor the main plasma facing components by means of real time surface temperature measurements, while providing essential data for various physics studies.

To monitor the new divertor targets, the WEST IR thermography protection system has been deeply renewed, to match with the new tokamak configuration. It consists of 7 endoscopes located in upper ports viewing the whole lower divertor and the 5 heating devices. Electronics devices and computers allow a real time data processing at a frame rate of 50 Hz, to ensure the protection of the main plasma facing components during plasma discharges by a feedback control of the heating devices injected power, and the data storage of  $\approx 3$  Gb/s IR images.

Each endoscope provides 2 views covering 2 divertor sectors of  $30^\circ$  (toroidally) and 1 view of a heating antenna. Each optical line is composed of a tight entrance window followed by a head objective which forms an image transported through the endoscope by a series of 4 optical relays and mirrors, up to a camera objective. Finally, 12 IR cameras specially developed for WEST environment capture the thermographic data, at the wavelength of  $3.9 \mu\text{m}$ , with a  $640 \times 512$  pixels frame size.

This paper provides a comprehensive description of the design options and diagnostic technologies: optics, mechanics, electronics, hard & software, cameras, as well as the assembling and environmental constraints. The laboratory characterization procedures are explained (Modulation Transfer Function MTF, slit response, calibration), and the measurement performance results are given (spatial and thermal resolution, temperature threshold). Finally, first results obtained during experimental campaign in WEST are presented and analyzed.

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