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P3.013 Status of development and commissioning of the TCV EC-system upgrade

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The upgrade of the EC-system of the TCV tokamak has entered in the realization phase as part of a broader upgrade of TCV[1]. The first of the two MW-class, dual-frequency gyrotrons (84 or 126GHz/2s/1MW) has been delivered by Thales Electron Devices and the full commissioning and characterization is expected to be completed during the first half of 2018. The design of this gyrotron includes new features such as an optimized launcher for the dual-frequency operation, improved cavity and collector cooling, and a steerable last internal mirror. A novel Matching Optics Units adapted for the dual-frequency operation has also been developed [2]. The successful validation of these new features will strongly enhance the gyrotron development in Europe.

In parallel to the gyrotron development, for extending the level of operational flexibility of the TCV EC-system the integration of the dual-frequency gyrotrons adds a significant complexity in the evacuated 63.5mm-diameter HE11 transmission line system connected to the various TCV low-field side and top launchers.

An important part of the present TCV-upgrade consists of inserting a modular closed divertor chamber. This will have an impact on the existing X3 top-launcher which needs to be reduced in size and complexity to facilitate manned entry into the vacuum vessel when the divertor reconfiguration is implemented. This will be realized by mounting two, new, independent X3 top launchers each connected to one of the dual frequency gyrotrons.

The main design features and test results of the gyrotron and MOU, together with specific aspects of the transmission line system and new X3-launchers will be described.

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[1] A. Fasoli et al., this conference

[2] A. Moro et al., this conference

Presenter: Dr ALBERTI, Stefano (Swiss Plasma Center EPFL)

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