

## ALMA 183 GHz Water Vapor Radiometer

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### ABSTRACT

The ALMA project hardware development is a challenge for many research groups and commercial companies. It is not common that state-of art performance must be combined with reliability and low cost in high frequency radiometer hardware.

The ALMA Water Vapor Radiometer is a complete radiometer system consisting of quasi optics, calibration system, 183 GHz mixers and LNA's, local oscillator system and filter-bank back-end. This is supported by an embedded computer, a high performance power system and an advanced thermal control of the complete system as well as key components.

Omnisys is responsible for the design, implementation, verification and production of 60 WVR's. The development part of the project is 12 months from kick-off to delivery of the first unit, including verification. The design will not be based on the demonstration models in any sense, not on component level, not on subsystem level and not on system level. The only common parts are that it is a switched system and a schottky mixer is used in the Front-End.

The preliminary design indicates a mass of less than 25 kg and a power consumption of 25-30 W for the complete instrument, including features and functions such thermal stabilization, a chopper wheel and extensive monitoring and control.

The radiometer system optimization as such will be presented.

The design for production and design for reliability aspects will be presented.

The signal chain from mixer to filter-bank design will be presented, including test results.

The quasi optical design will be presented, including test results.

