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MEDA PS and MEDA HS: Pressure and Relative Humidity sensors for Mars 2020 Rover

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Finnish Meteorological Institute (FMI) provides a pressure measurement device (MEDA PS) and a relative humidity measurement device (MEDA HS) for NASA's Mars 2020 rover [1]. The sensors are part of Mars Environmental Dynamic Analyzer (MEDA), a suite of environmental sensors provided by Spain's Centro de Astrobiología [2]. MEDA's principal goals are to provide continuous measurements that characterize the diurnal to seasonal cycles of local environmental dust properties and near-surface environment.

MEDA PS and MEDA HS are designed, built and calibrated by FMI. The main scientific goal of both devices is to measure pressure and relative humidity of the Martian atmosphere and complement the previous Mars mission atmospheric measurements for better understanding of the Martian atmospheric conditions.

MEDA PS is a pressure measurement device based on silicon micro-machined capacitive Barocap® pressure sensors developed by Vaisala Inc. The technology of the Barocap® is well known and it has been used before in 6 missions, including MSL (REMS-P) and Exomars 2016 Schiaparelli lander (DREAMS-P). MEDA PS is located inside the temperature controlled Instrument Control Unit (ICU) and connected to the atmosphere through a dedicated pipe. MEDA PS will measure the dynamics of the Martian pressure environment and is also able to detect rapid pressure changes. MEDA PS flight model has completed it's sensor level tests and delivered to Spain for higher level integration and tests.

MEDA HS is a miniature relative humidity device based on polymeric capacitive Humicap® humidity sensors developed by Vaisala Inc. The same technology has previously been used in MSL (REMS-H) and Exomars 2016 Schiaparelli lander (DREAMS-H). The humidity device is mounted on the Remote Sensing Mast providing ventilation to the ambient atmosphere through a filter protecting the device from airborne dust. MEDA HS flight model's sensor level tests at FMI are currently ongoing.

Both pressure and relative humidity measurements on Mars are recorded by the ICU at least once per hour. MEDA PS and MEDA HS and the whole MEDA sensor package is expected to operate for at least 1 Martian year.

[1] NASA website, "Mars 2020 Rover", https://mars.nasa.gov/mars2020
[2] J.A. Rodriguez-Manfredi et.al.: MEDA, the environmental dynamics analyzer for Mars 2020, 3rd International Workshopon Instrumentation for Planetary Missions (2016)