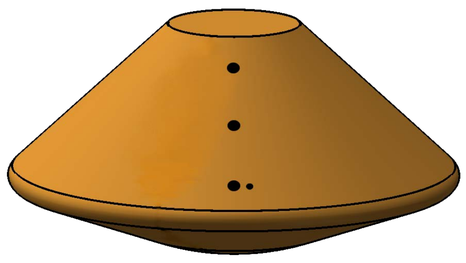
9th International Planetary Probe Workshop, Toulouse, France, 16th-22nd June 2012

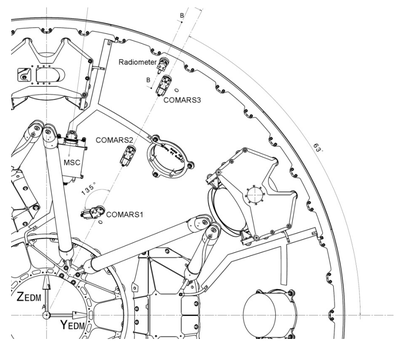
Combined Sensor Assembly COMARS+ for Martian Atmospheric Entry



Frank Siebe, Thomas Thiele, Ali Gülhan

German Aerospace Center (DLR)

e-mail: ali.guelhan@dlr.de

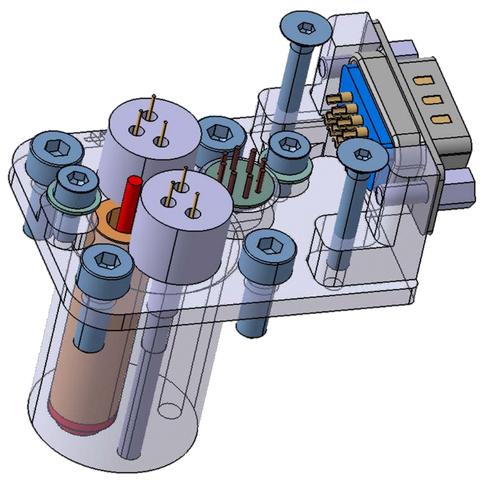


CONTEXT & OBJECTIVE

Although the total aerothermal loads on the base of a capsule are significantly lower compared to the front surface loads during Martian entry, big attention has to be paid to the determination of the radiate heating on the base. There is a big lack in prediction of the radiative heating with CFD tools. The ground testing facilities are not able to simulate the entry conditions completely. These facts force system engineers to perform the design with some margins, i.e. higher mass of the back cover TPS. Therefore in flight measurements of the aerothermal loads is essential. To close this gap DLR initiated in cooperation with ESA and support of Thales Alenia Space the development of the COMARS+ sensor complex including integrated narrow band radiometer of CNES.

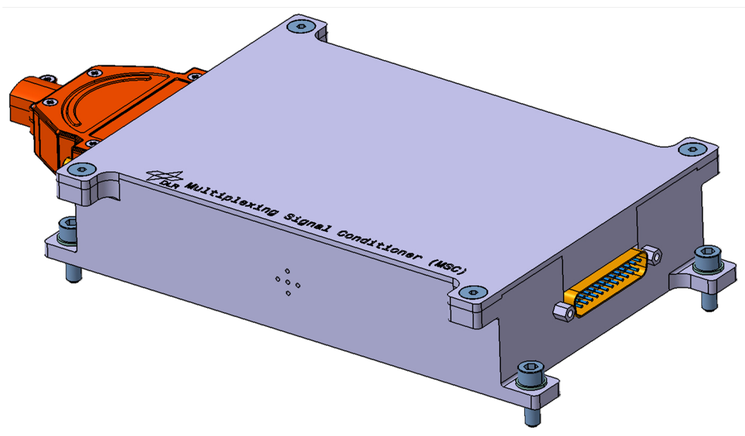
Overview

COMARS+ Sensor head



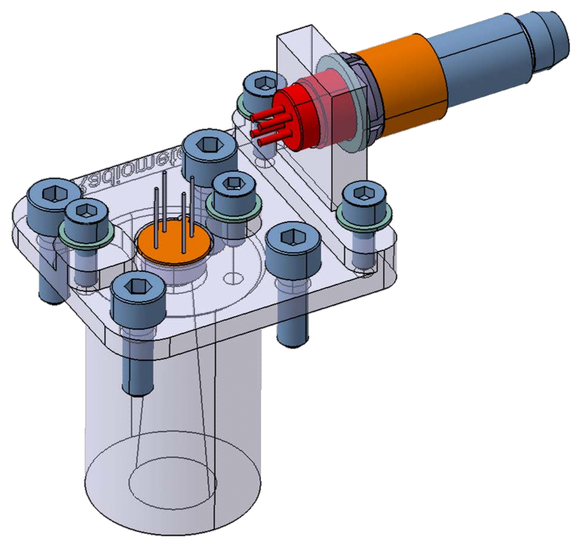
- Total Heatflux
- Temperature
- Pressure
- CO_2 Radiation on two bands (CNES)

Multiplexing Signal Conditioner



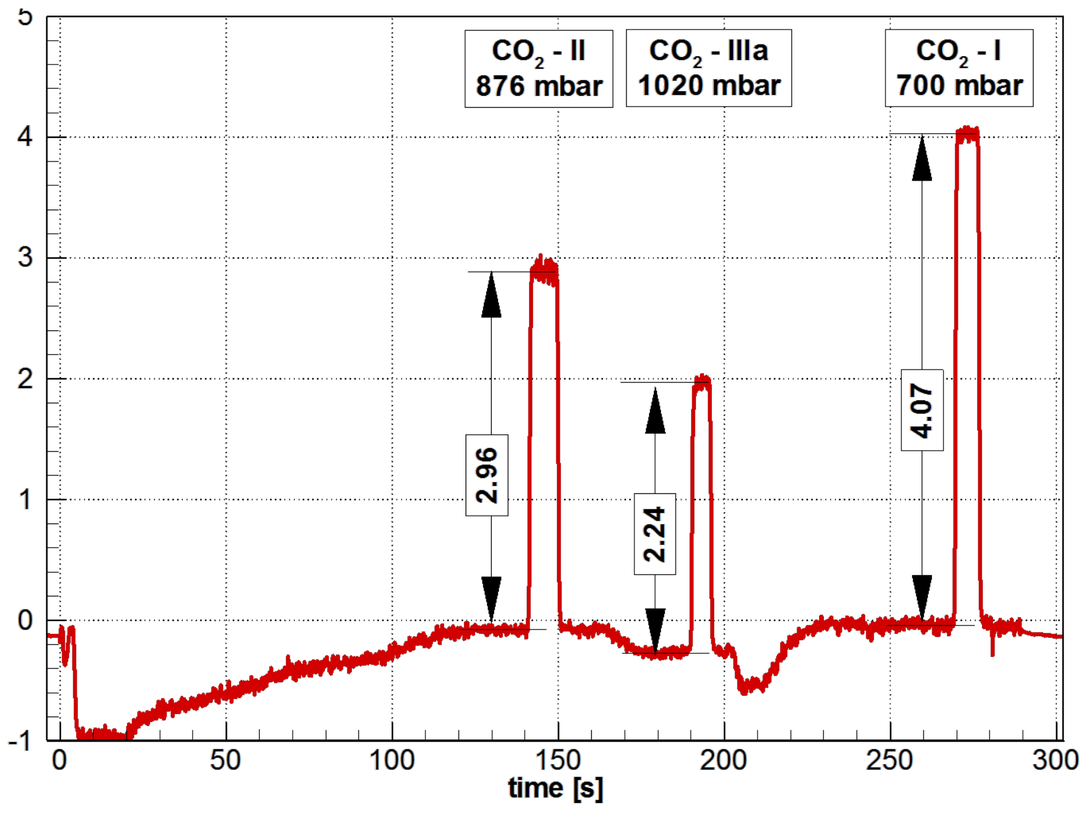
- Signal conditioning (21 Channels)
- Recording of housekeeping signals
- Multiplexing to three outputs (3x7+HK)
- Power supply of sensors and electronics

Radiometer Sensor head

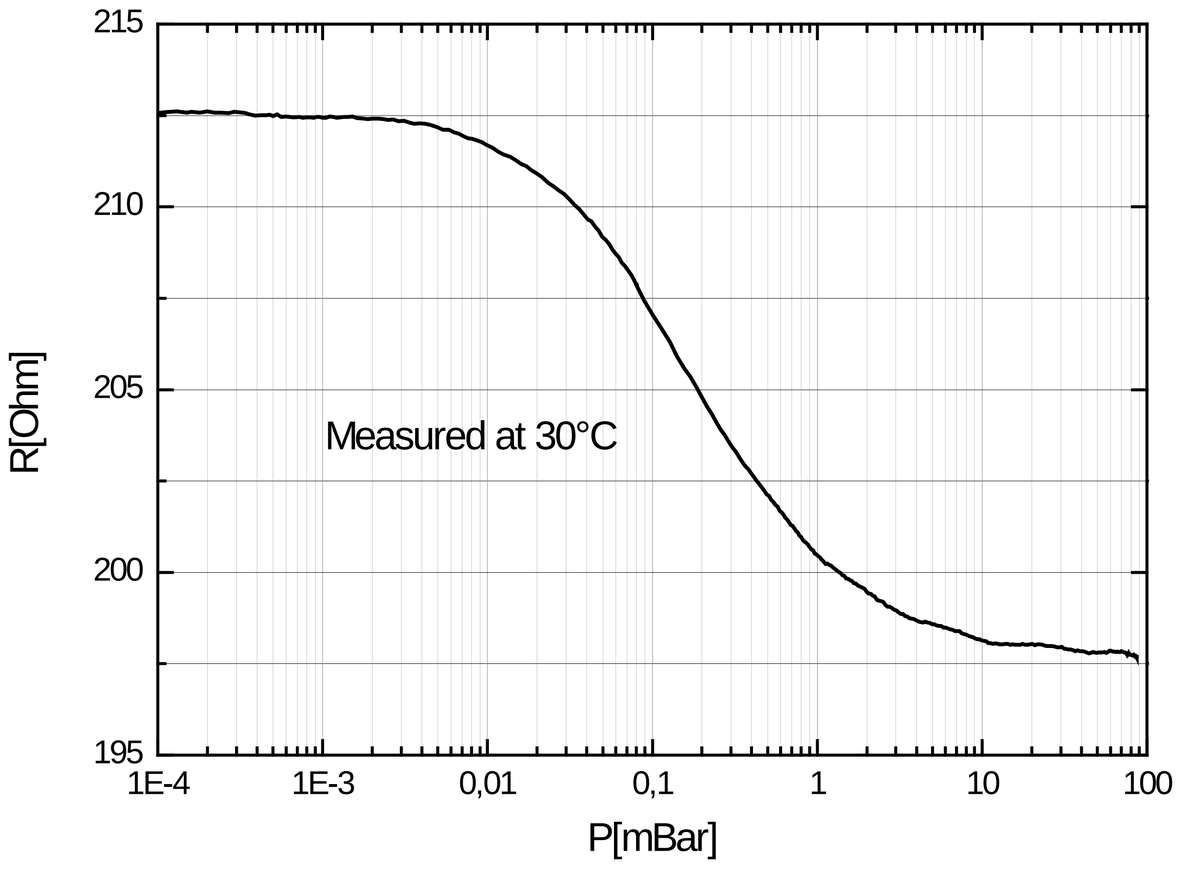


- Radiative Heatflux (DLR)
- Sensor Temperature

DLR Radiometer



Pirani Pressure Sensor



CONCLUSION & OUTLOOK

Manufactured engineering models and the conducted tests proof the feasibility of the chosen concept to measure the aerothermal properties on the base of a capsule during Martian entry. The described concept is accepted for the back shield instrumentation of the **EXOMARS 2016 Lander** and passed the PDR for this mission. If the 2016 mission is on time the first aerothermal data of the back shell of an Martian lander will be obtained in **October 2016**.