

Controller for in-situ pressure and humidity measurements on board ExoMars 2020 Surface Platform

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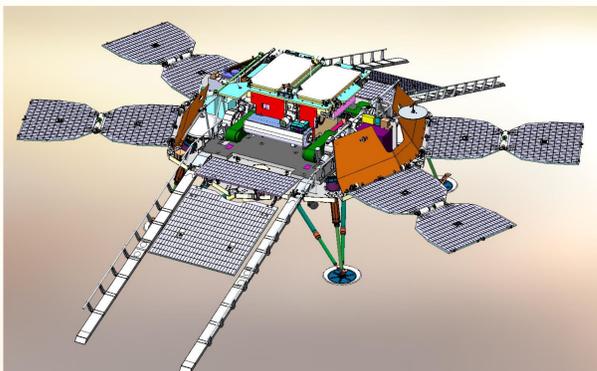
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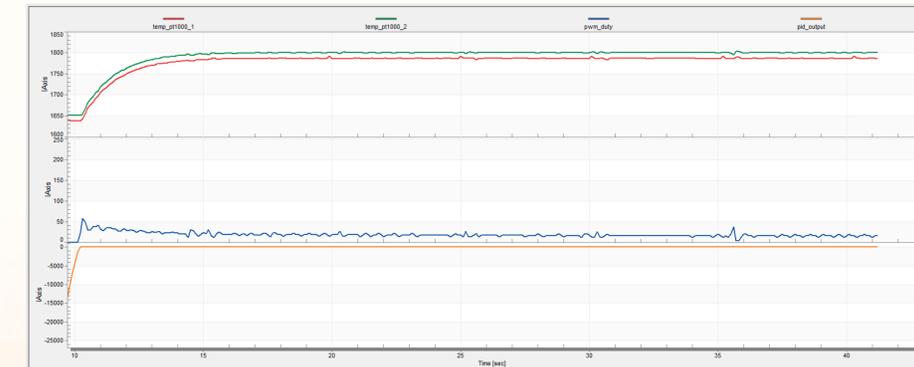
Finnish Meteorological Institute (FMI) has developed a compact instrument pair for the ExoMars 2020 mission, consisting of the METEO-P pressure and METEO-H humidity measurement devices. The devices are part of the METEO meteorological instrument package on board the Surface Platform (SP) element of the mission. **The measurement devices are controlled by a low power automotive microcontroller which has been qualified for use on Mars missions by FMI.**



The Russian (Roscosmos/IKI) built Surface Platform delivers the ESA rover on Mars and hosts a suite of Russian and European science investigations (Credit: Roscosmos/Lavochkin/IKI)

A. Controller functionalities

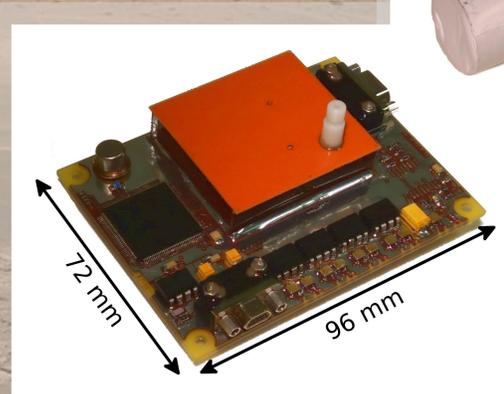
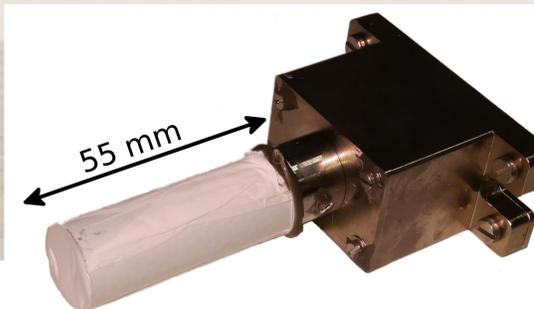
- Power distribution to METEO-P and METEO-H transducers via switches
- Scientific frequency measurement of METEO-P and METEO-H sensors
- Voltage measurement of humidity measurement calibration PT1000 temperature sensors
- 8 updatable non-volatile measurement configuration tables
- Humidity sensor regeneration with PID controlled heater
- +12 V analog power supply status detection
- RS-422 Command and data communication with METEO Central Electronics Unit



Regeneration test data: Humidity sensor temperature in ADC units, heater power switch PWM duty cycle (max value 254) and PID algorithm output value

B. Redundancy features

- 8 updatable + 1 non-updatable software images stored in flash
 - Bootloader calculates on startup the SW image code checksum, compares it to stored checksum value and starts operation with the first intact SW image
 - SW image update process calculates the checksum and compares to the one received in the update command
- Non-volatile configuration tables are dual redundant and protected with Error Correcting Code (ECC)
- Power switch SW logic protects measurement devices



METEO-P pressure device STM

METEO-H humidity device STM

