ELEKTRA 5

Electronics for Kongsberg Technology of Rotating Assemblies

A SADE for High Power, Open Loop control, To be qualified for the BepiColombo MTM program

KONGSBERG

The ELEKTRA is a SADE (Solar Array Drive Electronics) unit developed by KDA. The ELEKTRA commands the angular speed and position of a solar array drive mechanism (SADM), based on commands from the Spacecraft.

ELEKTRA can drive one or two 2-phase stepper motors simultaneously and independently. Power, position, speed, acceleration and step-mode (micro-step) parameters are configurable via telecommands.

ELEKTRA has full redundancy; the redundant controller is operating in cold redundancy. Nominal and redundant controller drive separate windings of the same stepper motor.

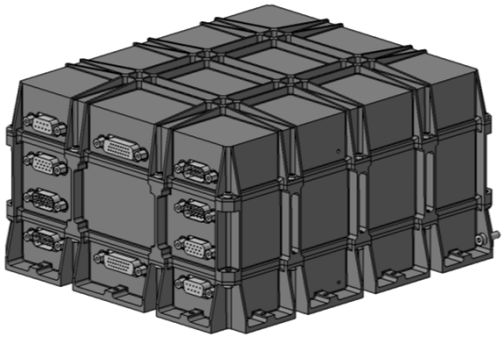
Operational commands and telemetry are provided through the MIL-STD-1553B communication bus. Additional interfaces include redundant High Level channels for ON/OFF control, Contact Closure channels for status telemetry and thermistors with redundancy for temperature monitoring, Solar Array Voltage and Current monitoring. Temperature monitoring can be performed regardless of the state of the ELEKTRA.

Each of the 2 controllers are independently powered with a nominal voltage of 28V(+/-3%).

Provisions are included for functional verification at any stage of the spacecraft assembly.

The ELEKTRA provides the following advantages:

- Advanced electronics design to high reliability and efficient performance
- Highly efficient power DC/DC converter with custom input filter
- Over voltage protection and under voltage lock out
- Power level to motors can be commanded
- Temperature monitoring even as the ELEKTRA is switched OFF
- Internal current limiter prevents fault propagation
- MIL-STD-1553B validated to AS4111



Features

General

- •Drive electronics for 1 or 2 stepper motors independently
- •SADE function with full redundancy
- •Micro step and full step selectable
- •Constant power to motors
- •Maximum nominal power is 35W to each motor
- •6.3W for SADE during motor operation
- •Less than 2W consumption when Idle
- •Operating temperature -30℃ to +60℃
- •Qualified non-operating -40 ℃ to 75 ℃
- •Qualified operating -35 ℃ to 70 ℃

Interface

- •MIL-STD-1553B bus communication
- •High Level On/Off
- •Contact Closure for status telemetry
- •SA Voltage and Current Engineering signals
- •Temperature monitoring with redundancy
- •Power bus 28V nominal
- •Mass 2.9 kg

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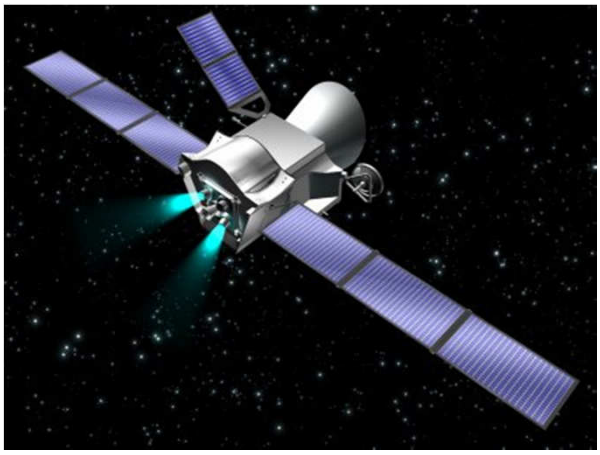
BepiColombo will study and contribute to the understanding of the composition, geophysics, atmosphere, magnetosphere and evolution of Mercury, the innermost planet in the Solar System.



In particular, the mission objectives are to study:

- origin and evolution of a planet close to its parent star;
- Mercury's form, interior structure and composition;
- interior dynamics and origin of its magnetic field;
- exogenic and endogenic surface modifications, cratering, tectonics, volcanism;
- composition, origin and dynamics of Mercury's exosphere and polar deposits;
- structure and dynamics of Mercury's magnetosphere; and
- to test Einstein's theory of general relativity.