Accurate Attitude Determination and Control System

Unique Features:

- **Ultra-low power consumption for efficient utilization on pico-satellites, proven in-orbit**
- **Space-saving design in combination with matching side panels**
- **Highest flexibility: control software can be completely updated in-orbit**
- **Easy integration: compatible to UNISEC Europe electrical interface standard**
- **Sandbox scripting language support with access to all internal functionalities**

Description:

The attitude determination and control system is based on the low-power flight proven design of the University Würzburg Experimental satellite UWE-3. It features multiple magnetic field sensors, redundant gyroscopes, and interfaces with high precision sun-sensors. The attitude is estimated using an isotropic Kalman filter while magnetic torquers are used for efficient coarse pointing (also available in combination with reaction wheels).

The board interfaces with the satellite bus via the UNISEC Europe standard for CubeSats and is fully updateable in orbit. Furthermore, it comes with an efficient scripting tool embedded in a sandbox environment on board. This enables the test of advanced attitude control algorithms and maneuvers at very low risk and effort.

The system is capable of performing detumbling (in-orbit demonstrated) from > 100 deg/s in < 60 minutes). The operational modes include Target pointing (Inertial pointing, e.g. Sun, Earth fixed and Inter-Satellite (orbit to orbit).

Spin stabilization is possible (using magnetic torquers) at spin rates of up to 100 deg/s (demonstrated in orbit).

Specifications:

Power consumption		
• off	< 10	mW
• determination mode	< 65	mW
• magnetic torquer	< 110	mW
Mass	50	g
Attitude knowledge[1]	< 1	deg
Magnetic moment per axis	0.01	Am²
Controllable spin rate	< 500	deg/s
Pointing accuracy[2]	< 1	deg
Dimensions	90x87x11	mm

[1] With fine sun-sensors
[2] With reaction wheel
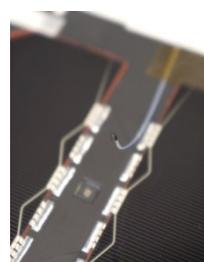
sun sensors

inner side of solar cell panel