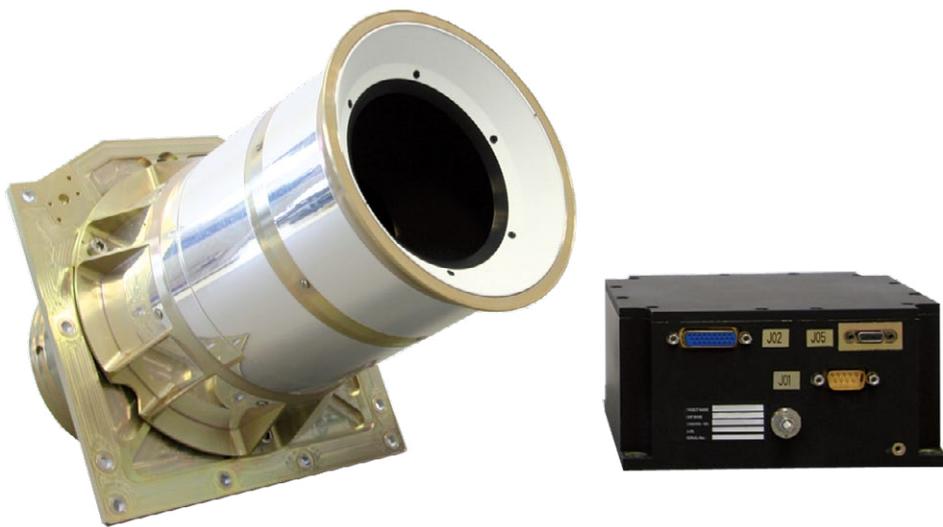


## Autonomous Star Sensor ASTRO 10

The Jena-Optronik **ASTRO 10** is an Autonomous Star Sensor for LEO and GEO applications.



**Its Electronic Box is separated from the Optical Head for a flexible accommodation on the spacecraft, giving minimum thermal impact on the S/C structure and maximum pointing capability.**

### Special Features

- Lifetime > 12 years
- Low mass Optical Head

### Technology for Star Sensors

The requirements for the sensors are very demanding. In addition to measurement accuracy and efficiency, reliability and durability play a decisive role. All of our developments have proven this value under the conditions in space. In-flight data are available and considerably better than specified.



## ASTRO 10 Star Sensor Performance

Germany's first satellite-based reconnaissance system SAR-Lupe

Dimensions			
Optical Head + 30° Baffle	140 mm Ø x 264 mm	[including Baffle]	
Optical Head + 40° Baffle	130 mm Ø x 205 mm	[including Baffle]	
Electronic Box	150 mm x 145 mm x 75 mm		
Mass, e.g. LEO application			
Head [w/o Baffle]	< 1180 g for 30° Baffle	< 1130 g for 40° Baffle	
Baffle	540 g for 30° Baffle	340 g for 40° Baffle	
E-Box	< 1360 g		
Harness [2 cables]	290 g for 1 m length	[length < 2,5 m]	
Optical Design			
Lens	refractive	focal length 30 mm	aperture 23 mm Ø
CCD Detector	resolution 668 x 520 pixels	pixel size 12.9 µm x 12.9 µm	
Temperature Range			
Operational Optical Head	-40 °C...+40 °C		
Operational E-Box	-40 °C...+50 °C		
Non-operational Sensor	-50 °C...+70 °C		
Performance			
Field of View	16.7° x 12.5° [effective]		
Attitude accuracy [LSFH, HSFE, TE]	< 1.5 arcsec [1σ] xy-axes	< 12 arcsec [1σ] z-axis	
Attitude re-acquisition	< 8 s [without a priori information]	< 5 s [with a priori information]	
Slew rate	1.0° s <sup>-1</sup> [full performance]	3.0° s <sup>-1</sup> [operational]	
Sampling time	125 ms		
Sensitivity	SNR = 10 for 6.0 m <sub>i</sub> G <sub>0</sub> -ref. star		
Power Consumption			
Total, Peltier Cooling off	< 8 W [at 20 °C I/F temp., at 28 V]		
Total, Peltier Cooling average	< 11 W [at 28 V]	< 15 W [Peltier Cooling max]	
Optical Head, Peltier Cooling off	< 2 W [at 20 °C I/F temp.]		
Optical Head, Peltier Cooling max	< 5.5 W		
Operating Modes			
In-Orbit	acquisition mode A	tracking modes B and C	simulation
	SW upload	photo	
On-Ground	teach-in	testing	calibration
Data Interface			
	redundant	RS-422 [or customer specified, e.g. MIL-STD-1553B]	
Input Voltage Range			
	nominal 28 V DC	range 22 V - 60 V DC	
	other voltages available		
Reliability			
	< 600 FIT		