

ASTRO APS3

Jena-Optronik's **ASTRO APS3** is the latest development of an autonomous high-reliable Star Sensor. ASTRO APS3 follows the very successful ASTRO APS and continues all well-known features while it comes with an improved performance within a smaller footprint and reduced mass.



Highly modular design is used to serve wide variety of customer specific interfaces to support all applications, missions and orbits from LEO, MEO, GEO, lunar orbits and beyond for deep-space missions.

Based on the heritage of the very successful ASTRO APS with more than 500 units contracted, ASTRO APS3 extends existing functionalities and performance while being more compact and lightweight at favourable price.

Features

- Lifetime on orbit >18 years
- 26° sun exclusion and full performance with moon in the field of view
- Internal data processing with powerful CPU, output of attitude quaternion
- Almost drop-in replacement for ASTRO APS

ASTRO APS3 highlights

- New features like real-time lost in space acquisition (~1 sec), the single shot & series photo mode
- Improved optical budget with lowered limiting magnitude of 7.0m
- Background adaptation including DSNU, dark current, white spots and SEU rejection ensures super-fast acquisition and tracking even under maximum heavy solar flare conditions
- True real-time snap shot images and image series, e.g. for relative optical navigation

ASTRO APS3 Performance

Layout	
Architecture	Autonomous Star Sensor with electronics & processing included
Field of View (circular)	20deg full-cone
Optics	refractive, focal length 29 mm, f/1.0
Image Sensor	FaintStar2 system-on-chip - 1024px x1024px
Performance	
Update Rate (Tracking)	8, 10, 16 Hz
Attitude Accuracy¹ XY / Z @ 1σ	$\leq 0.8 / 7.0$ arcsec @ rates < 0.1 deg/sec (¹ Total Error incl. LSFE & HSFE)
Acquisition Time	< 1 sec time to first fix from Lost-in-Space (without a priori information)
Slew Rate in Acquisition	≤ 6.0 deg/sec
Magnitude Limit	7.0 mi G0-reference star
Moon in Field of View	No Degradation
Reliability	Class1 EEE Parts, 100krad / 330/375 FIT, TI/F=30°C
Environment	
Operating Temperature	-30°C to +50°C without TEC (= Thermal-Electric Cooler / Peltier Cooler), +60°C with TEC
Storage Temperature	-40°C to +70°C
Radiation	Up to 15 years in LEO and >18 years GEO orbit without additional shielding
Physical	
Nominal Envelope	148mm x 142mm x 210mm (including 26 deg baffle, connectors & bonding stud)
Sun Exclusion Angle (half cone)	26.0 deg
Earth Exclusion Angle (half cone)	Approx. 20.0 deg
Mass	≤ 1.8 kg (including 26 deg baffle)
Layout	
Supply Voltage	5V, 28V, 50V, 100V
Nominal Power Consumption	< 6 W TEC off, < 8 W TEC on
Output	Attitude Quaternion and Rate Vector, Status and Health Telemetry, Full-Frame Images
Operational Interface	SpaceWire, MIL-STD-1553; RS422 UART