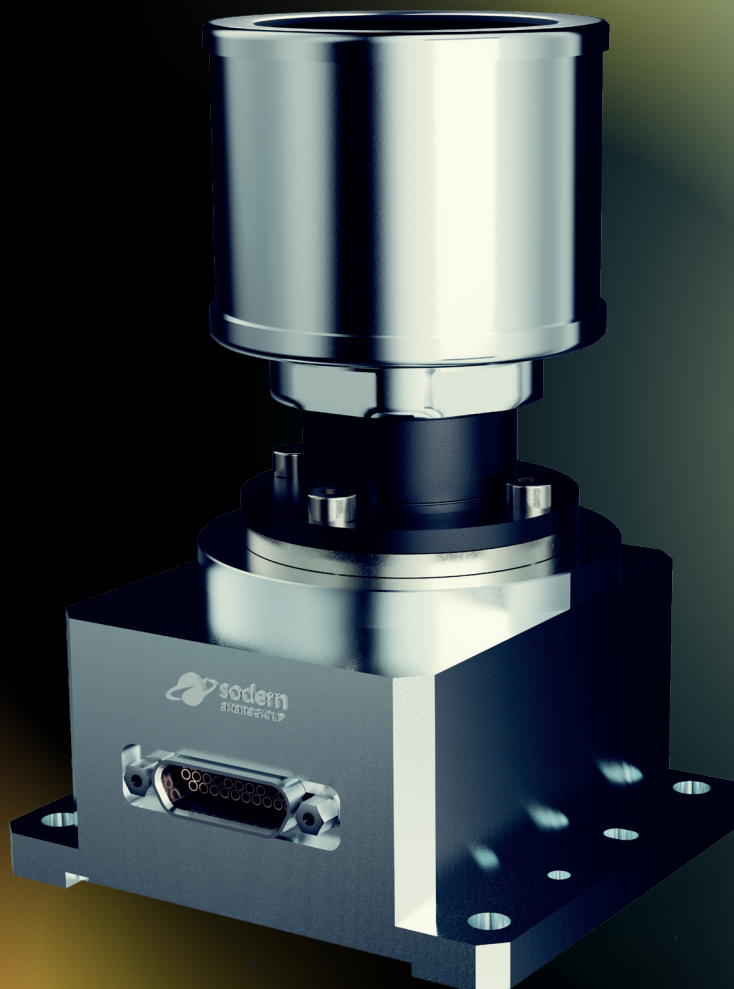


AURIGA™

BEST-IN-CLASS STAR TRACKER

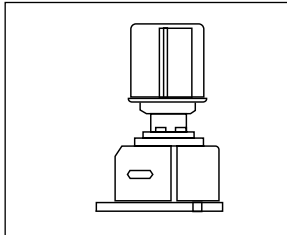


SPECIFICALLY DESIGNED FOR SMALL SATELLITE MISSIONS,
COST EFFECTIVE, HIGH PRODUCTION RATE, REDUCED WEIGHT AND VOLUME
10 YEARS LIFETIME IN LEO ORBIT (400-1200 KM) AND 15 YEARS IN GEO ORBIT
FLIGHT PROVEN SINCE 2019, OVER 1500 UNITS LAUNCHED
30+ MILLION HOURS OF OPERATIONS WITH 100% MISSION SUCCESS

AURIGA™ LINE UP

- Excellent robustness especially at end of life and for high detector temperature conditions in both acquisition and tracking modes
- Embedded Star Catalog and Algorithms developed over 50 years of experience including Hydra star tracker
- 10 years lifetime in LEO orbit (400 - 1200km) and 15 years in GEO orbit
- EU Dual Use 7A104 – ITAR Free

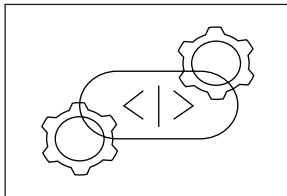
OPTICAL HEAD (OH) / BAFFLE



Size	66 x 59 x 94 mm
Mass	225 g
Power consumption	0.8 W

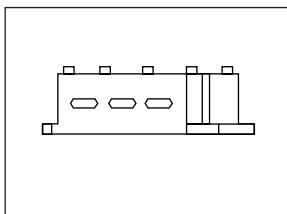
- Smart design & simple architecture
- Configurations up to 3 OH
- Fast acquisition and few arcsec accuracy with CMOS detector
- Baffle protection from Sun and Earth illumination
- Sun exclusion angle 35° (standard)

SOFTWARE



- Software can run in EU or can be implemented in satellite OBC. In case of software embedded on OBC, S/W library is available for different processors on demand.
- Multi-head merged attitude at up to 10 Hz
- Possible software options: Auriga-gyro & others available on demand to increase performance

ELECTRONIC UNIT - OPTIONAL - CENTRALIZED PROCESSING VERSION AVAILABLE¹



Size	91 x 117 x 25 mm
Mass	315 g
Power consumption	2.1 W + 0.8 W per OH

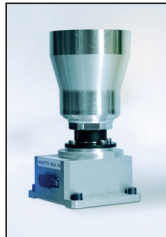
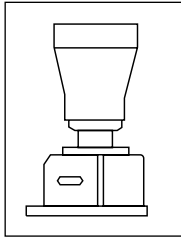
- Drives up to 3 OH through SpW I/F
- Communication I/F RS422 UART
- 5V power supply
- *Other EU compatible with CAN interface available - contact us for more information.*

MAIN CHARACTERISTICS

Low Frequency spatial (FOV) error XY / Z @ 3 σ	9 / 51 arcsec
High Frequency spatial (Pixel) error XY / Z @ 3 σ	6.6 / 38 arcsec
Slew rate in Acquisition	0.3 deg/s in baseline Up to 2 deg/s
Slew rate in Tracking	Up to 3 deg/s

AURIGA™ ADD-ON

HARDWARE OPTION • 26° BAFFLE



Size	60 x 66 x 122 mm
Mass	<250 g

Sodern is introducing a new baffle for Auriga™ offering a Sun Exclusion Angle of 26° to facilitate accommodation on satellite.

- Qualified end of 2024
- **FM available in 2025**

SOFTWARE OPTION • AURIGA-GYRO

For better pointing performance and high robustness to rate and acceleration in acquisition and tracking, the Auriga™-GYRO library receives information from the satellite gyrometer and provides:

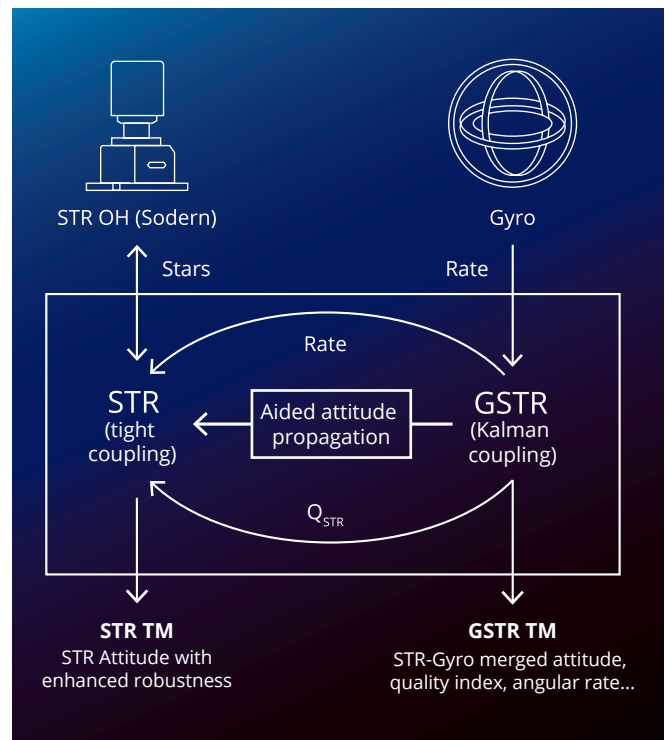
- Enhanced STR robustness through "tight coupling" with gyrometer
- A gyrometer – STR hybridised attitude, with dramatically reduced noise and 100% available, through Extended Kalman Filter

Recommended gyrometer minimum performances for Auriga-gyro:

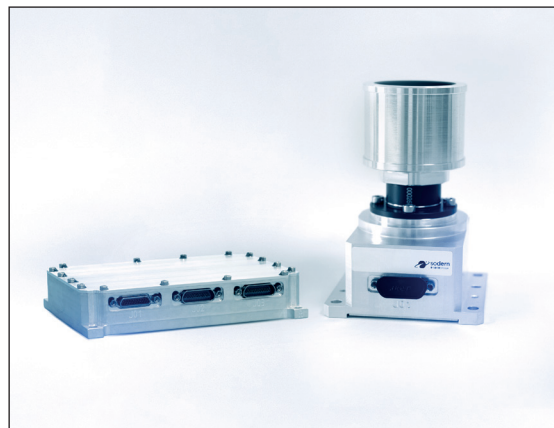
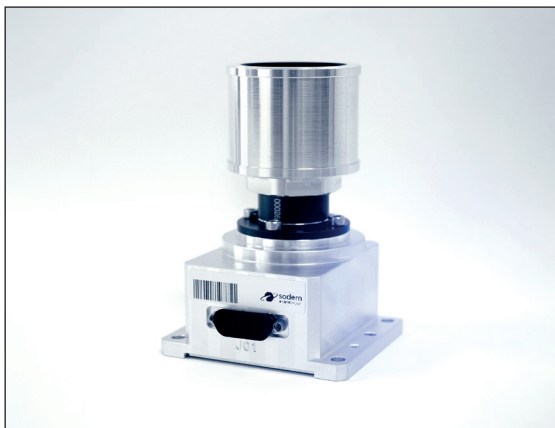
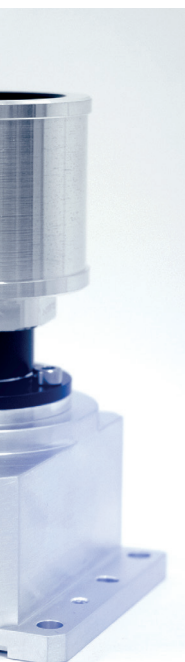
Angle random walk (ARW)	< 0,15 deg/√h
Rate random walk (RRW)	< 1 deg /h /√h

Auriga performances with gyro software option:

Slew rate in acquisition	up to 4 deg/s
Slew rate in tracking	Up to 10 deg/s and 10 deg/s²



AURIGA™ MAIN CHARACTERISTICS



Centralised processing configuration	With Electronic Unit
<ul style="list-style-type: none"> • Optical head connected to the spacecraft's OBC through SpaceWire interface with power supplying • Software operating frequency up to 10 Hz according to host processor performance 	<ul style="list-style-type: none"> • Embedded software in electronic unit processing OH's data and computing the attitude • Electronic unit can perform OH FDIR through autonomous individual OH switch ON/OFF • Electronic unit operating refresh rate of 10 Hz

END OF LIFE WORST CASE CONDITIONS DATA

ENVIRONMENTAL CHARACTERISTICS

	Optical head (OH)	Electronic Unit (EU)
Operating temperature range (°C)	- 20 / + 40	
Storage temperature (°C)	- 30 / + 70	
Mechanical environment (in/out of plane)	Vibration: 33 gRMS Shocks: 2000gSRS @2000 Hz	Vibration: 22 gRMS Shocks: 2000gSRS @2000 Hz
Size (mm)	66 x 59 x 94 (height, including baffle)	91 x 117 x 25 (height)
Mass (g)	225 (including baffle)	315

EEE LEVELS, RELIABILITY AND LIFETIME

	Optical head (OH)	Electronic Unit (EU)
EEE parts class	ECSS Class 3 equivalent	
Reliability	230 FIT (FIDES method @20°C)	470 FIT (FIDES method @20°C)
Lifetime (years)	10 in LEO 400-1200km / 15 in GEO with EOR	

AURIGA™ MAIN CHARACTERISTICS

ELECTRICAL INTERFACES

	Optical head (OH)	Electronic Unit (EU)
Power supply (V)	5V ($\pm 10\%$)	4.75 to 5.5V
Power consumption (W) (typical/max)	0.8 / 1.0	2.1 / 3.4
Output data	SpaceWire (50 Mbps signaling rate)	RS422 UART (115200 baud) CAN (open request)
Output rate (Hz)	8 or 10 (5 Hz possible to relax CPU load)	8 or 10

PERFORMANCES AND ROBUSTNESS

	Optical head (OH)	Electronic Unit (EU)	Auriga™ with Auriga- Gyro software
Bias (worst case)	0.017 deg		
Thermo-elastic Error (worst case)	<1.5 arcsec/°C		
Low Frequency spatial (FOV) error XY / Z @ 3σ	9 / 51 arcsec		
High Frequency spatial (Pixel) error XY / Z @ 3σ	6.6 / 38 arcsec		
Temporal noise on XY / Z @ 3σ	11 / 70 arcsec		
Time from lost-in-space (typical)	3.8s		
Slew rate in Acquisition	0.3 deg/s in baseline Up to 2 deg/s		up to 4 deg/s
Slew rate in Tracking	Up to 3 deg/s		Up to 10 deg/s and 10 deg/s ²
Acceleration in Acquisition	Up to 1 deg/s ²		
Acceleration in Tracking at 10Hz	Up to 2.5 deg/s ²		
Full Moon in the Field of View	No performance degradation		
Baffle Sun Exclusion Angle	35 deg (26° available)		
Baffle Earth Exclusion Angle	22 deg		
Solar flare Acqu/Tracking	Robust		

Product specifications are subject to change without notice or obligation

AURIGA™ OPTIONS

A FULL SET OF OPTIONS TO SUPPORT YOUR DESIGN,
VERIFICATION AND OPERATIONAL NEEDS

GROUND SUPPORT EQUIPMENT

Sodern proposes a full set of Ground Support Equipment to support the integration and validation of Auriga™:

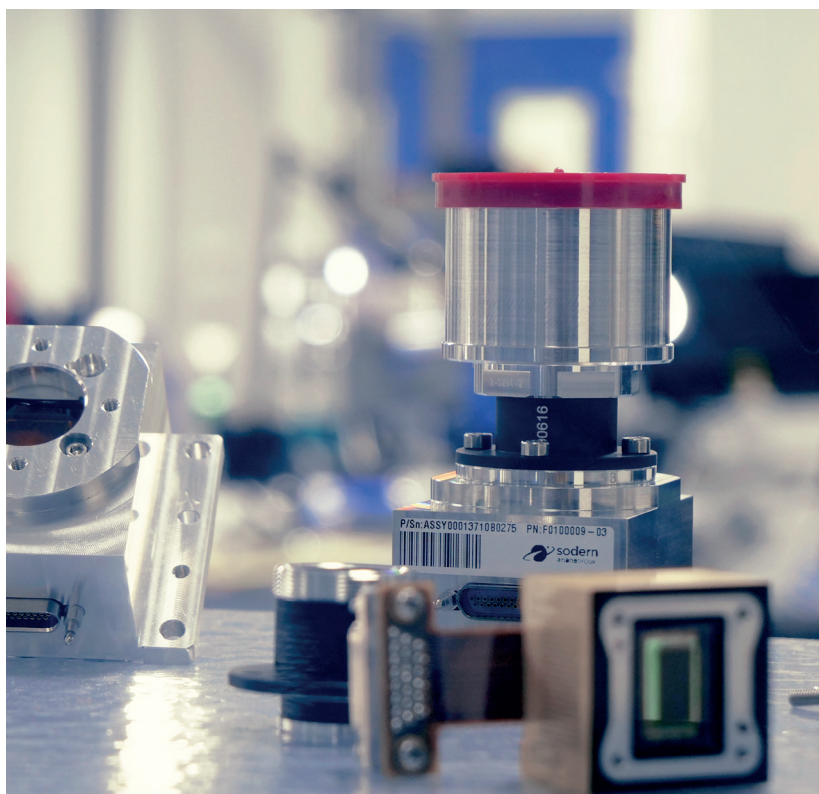
- Auriga engineering model (optical head and electronic unit)
- Star tracker numerical performance model
- Auriga™ A-DEOS: dynamic optical stimulator for AOCS/STR system Functional Tests. HW in the Loop
- Auriga™ STOS: static optical stimulator
- EGSE for stand alone testing of star tracker
- Additional ground support on-demand

TECHNICAL SUPPORT

Any questions about Star Trackers use or performance ? Our experts are here to help ! We offer several technical support options:

- Standard remote support packages (customers preferred choice thanks to fast response time)
- Training with our experts to become knowledgeable in our star tracker and GSEs, at Sodern site or at customer site
- Mission-specific Radiation and Performance assessments
- Additional technical support on-demand

CONTACT US AT: SALES-DEPARTMENT@SODERN.FR



STATE OF THE ART PRODUCTION FACILITIES

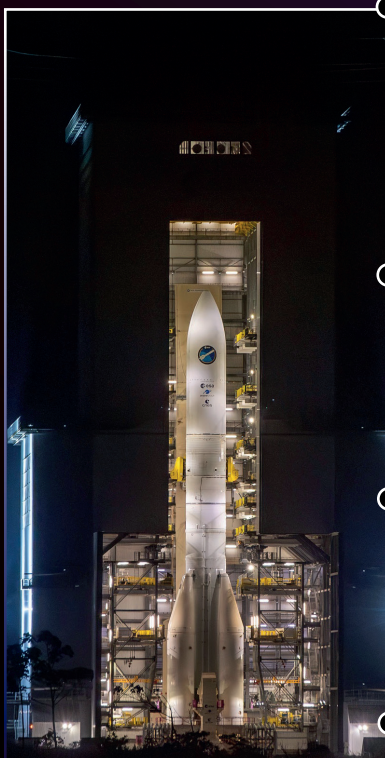


- Clean rooms from ISO level 5 to 7 including workstations and test benches
- Sodern is certified EN9100 and ISO 9001

PRODUCTION CAPACITY

- 200 auriga off-the-shelf at all time
- Up to 150 units / month manufacturing capacity
- Collocated engineering, production and testing

FLIGHT HERITAGE



- Over 1,500 Auriga™ are in orbit with 100% mission success rate
- Flight proven algorithm: more than 30+ million hours of successful operation
- Worldwide customer base

2019  

ANGELS: HEMERIA

Angels: Hemeria is equipped with Auriga™

2019  

ONEWEB CONSTELLATION

Sodern equipped all satellites with 1,200 Auriga™

2023 

NANOAVIONICS

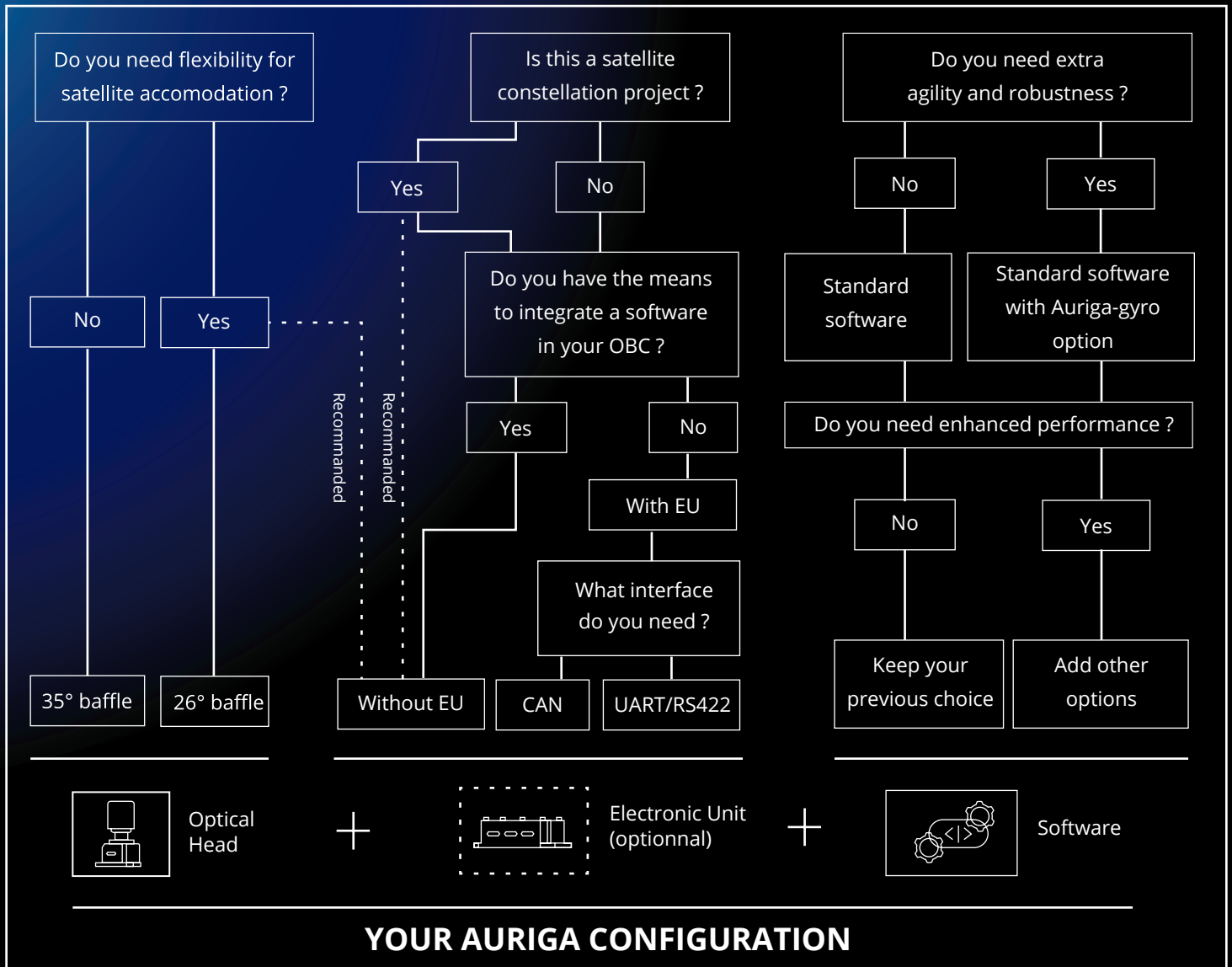
Auriga™ is on board several platforms

2022 - 2024

+300 Auriga™ launched in 2 years

SELECTION CHART

WHAT AURIGA™ CONFIGURATION IS BEST FOR YOU?



We are available to discuss your business needs and mission requirements, provide pricing and technical proposal :

CONTACT US: SALES-DEPARTMENT@SODERN.FR

20 avenue Descartes
94451 Limeil-Brévannes
Cedex France

SODERN.COM

