

Optically Enhanced Attitude & Heading Reference System “OptoAHRS™-II”



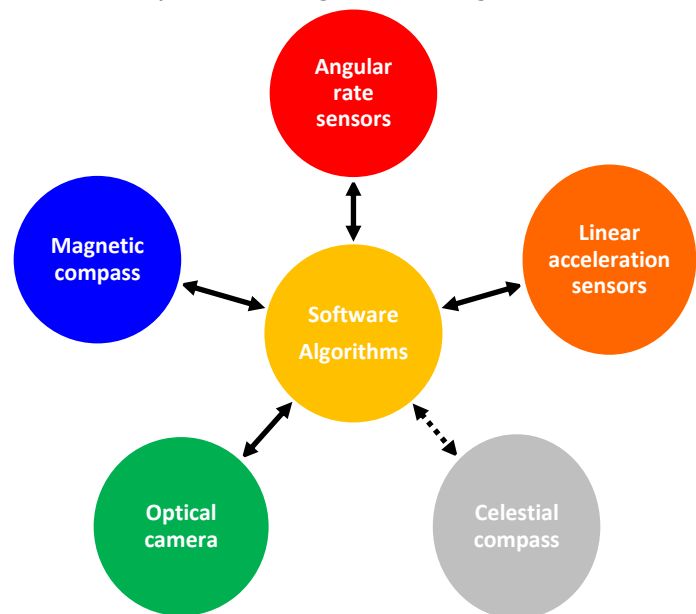
Developed by **Inertial Labs**, the Optically enhanced **Attitude and Heading Reference System** – **OptoAHRSTM-II** is a small size, lower power consumption, precise North finding and North keeping system. It combines technologies of inertial sensors with optical image tracking resulting in a robust and reliable 3DOF orientation module capable of operation in virtually any environment.

With the addition of optical image tracking the system is now able to mount directly to a device under measure, and with one known reference direction, can be turned on and operated immediately without any magnetic calibration whatsoever. During operation, the device's magnetometer calibrations are able to be derived on-the-fly allowing for the device to operate with both optical and magnetic heading determination.

OptoAHRSTM-II works through the use of reference images. A reference image is literally a picture of the horizon in a given direction. Within the reference image the system identifies a constellation of identifiable features.

Then, from any subsequent image collected by the camera, heading is determined by comparing those images back to the most appropriate reference.

Additionally, when the system is operating with good optical data, it uses the information it collects to continuously check results against magnetic heading information and dynamically calibrates the device against magnetic interferences present in the environment.



Each of the technologies compensate for each other's deficiencies and errors, acting as a self checking and calibrating system. For example, if a magnetic change is sensed, but the camera and accelerometers see no change - the magnetic change is ignored.

Applications:

- land survey;
- geodesy and cartography;
- cranes safety and control systems;
- geospatial systems;
- oil & gas drilling;
- antenna pointing systems;
- platforms North finding and North Keeping.



KEY FEATURES AND FUNCTIONALITY

- OptoAHRSTM-II eliminates large errors inherent with Digital Magnetic Compass technology
- Hybrid North finding and North Keeping System
- Real-time optical and inertial sensors orientation tracking
- Highly accurate, sensitive, and temperature stable Fluxgate magnetometers (in-house technology)
- Advanced, extendable, embedded Kalman Filter based sensor fusion algorithms
- Embedded 2D and 3D magnetic calibration on hard and soft iron
- Environmentally sealed (IP67)

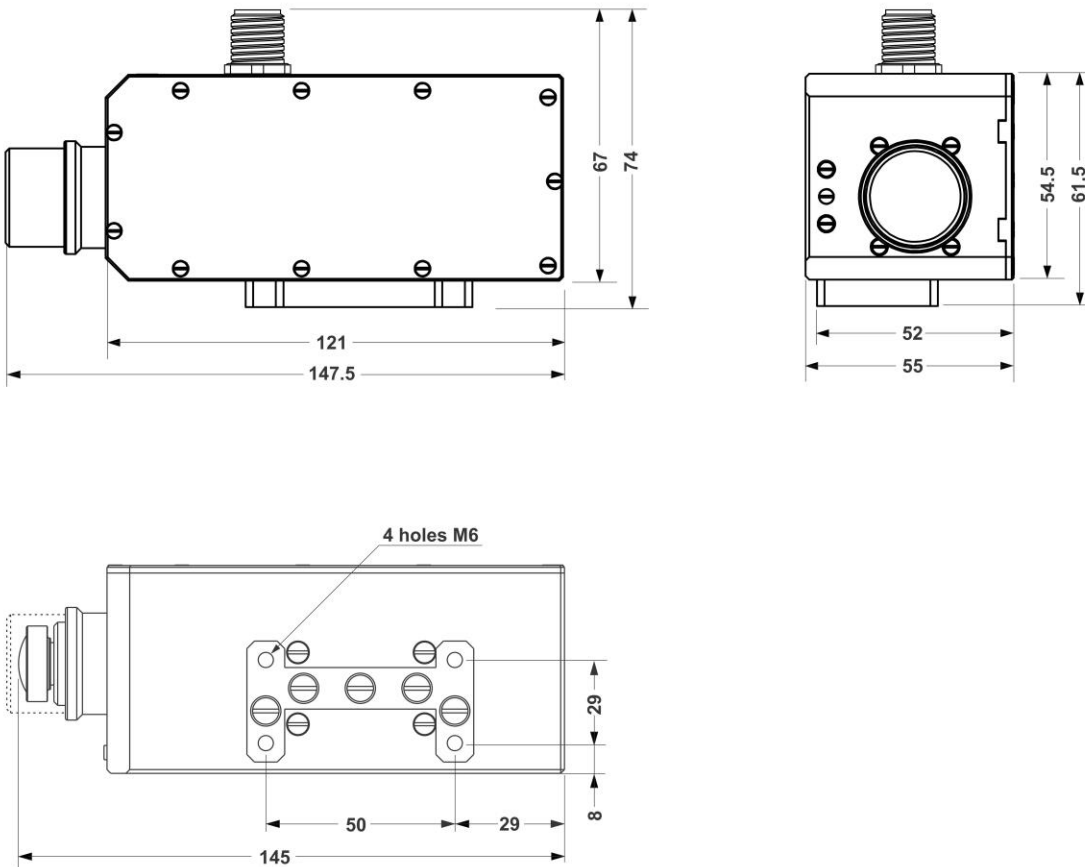
OptoAHRSTM-II Specifications

Parameter	Units	
Output signals		Heading, Pitch, Roll; Azimuth and Elevation
Update rate	Hz	100
Start-up time ⁽¹⁾	sec	10
Full accuracy data (Warm-up Time) ⁽²⁾	sec	30
Heading		
Range	deg	0 to 360
Angular resolution	deg	0.01
Accuracy (0 to 360 deg, relative to the 1 st reference)	deg	<0.2
Noise (at 100 Hz output)	deg RMS	<0.02
Attitude		
Range: Pitch, Roll (autonomous)	deg	0 to 360
Angular resolution	deg	0.01
Accuracy in whole temperature range	deg	0.08
Noise (@100 Hz)	deg RMS	0.02
IMU		
Gyroscopes bias in-run stability	deg/hr	1
Accelerometers bias in-run stability	mg	0.005
Magnetometer bias in-run stability	nT	0.1
Environment		
Operating temperature	deg C	-30 to +70
MTBF	hours	55500
Electrical		
Supply voltage	V DC	7.0 to 8.0
Power consumption	W	3.5
Interface		
Standard	-	USB
Rate	Mbit/sec	480
Physical		
Size	mm	145 × 61.5 × 55
Weight	gram	600

⁽¹⁾ it may be reduced on request

⁽²⁾ including the time of initial alignment

OptoAHRSTM-II Mechanical Interface Drawing



Notes:

1. All dimensions are in millimeters.
2. All dimensions within this drawing are subject to change without notice. Customers should obtain final drawings before designing any interface hardware.

OptoAHRSTM-II Electrical Interface Description

Inertial Labs provides a custom cable set for ease of operation with the OptoAHRSTM-II. Refer to the OptoAHRSTM-II Interface Control Document for complete details.