

Meet OPUS-Inertial-R Series!

Miniature Rugged IMU / AHRS

OPUS-Inertial-R family is the smallest Plug & Play IMU / AHRS device in the industry.

Having industry standard interfaces (USB, RS232, CAN, UART) inside the tiniest package (30 mm x 30 mm) with super easy mounting scenario and flexible voltage input range: *OPUS-Inertial-R devices provide effortless integration to various systems*.

Low power consumption, high output rate (ODR) and cost-efficient structure make these devices a perfect match for lots of battery powered equipments. (i.e. UAV's, AGV's, any equipment that needs inertial data or orientation.)

OPUS-Inertial-R devices are the excellent cost-effective Rugged Inertial Sensor solution in industry.

KEY FEATURES

- > Precise Calibrated / Filtered Inertial Measurements
- Precise 3D Attitude (Roll / Pitch / Heading)
- Up to 1kHz of measurement output (ODR)
- Up to 1kHz of computed 3D attitude output (ODR)
- Smart mounting with **30 x 30 x 10 mm** dimensions
- USB / CAN / RS232 / UART interface capability
- Low power design (220 mW at 5V)
- Easy firmware interface for device control

FUNCTIONAL FEATURES

OPUS-Inertial-R series have the easiest Firmware Interface for device access and control. Some features can be configured with single line commands. Please request our firmware interface, EN_FI_OPUS-Inertial-R_REV1.0.pdf from technical@opusembedded.com for further information.^[1]

- Calibrated / Filtered IMU Outputs
- Precise 3D Attitude Information
- Adaptive Filtering
- WMM & EGM Models Inside
- Pressure Altimeter
- From 1Hz to 1kHz ODR Selection
- Coning & Sculling Integrals (Δθ, ΔV Vectors)
- Magnetic North / True North Outputs
- Manual Magnetic Calibration
- Sensor On & Off
- External Sensor Support

APPLICATIONS

- Indoor / Outdoor Navigation Systems
- Robotics
- UAV's / UGV's
- Battery Powered Systems
- Autonomous Ground Vehicles
- Guidance Systems

BLOCK DIAGRAM



ORDER INFORMATION





OPUS-Inertial-R Rugged IMU / AHRS Family

Device or Accessories: RI: Rugged IMU RA: Rugged AHRS RAM: Marine Rugged AHRS C: Compatible Cabling [See Note 1] A: Compatible Accessory [See Note 1]

Note 1: Customers can order standard cables as well as their custom cable needs. (i.e. 2.5m USB cable) Accessories can involve several converters embedded inside the cables. (i.e. USB / RS422 cable)

information.

^[1] Some of listed features are hardware ready and are going to be implemented with the following

firmware updates via OPUSDeviceManager Software. Please contact our technical team for further



TECHNICAL SPECIFICATIONS

IMU Sensor Specifications

Specification	Accelerometer	Gyroscope	Magnetometer	Barometer
Range	±2 g, ±4 g, ±16 g	±250 °/s, ±500 °/s ±2000 °/s	±2 G, ±4 G, ±8 G ±16 G	260 to 1260 mBar
Non-Linearity	0.5 %FS	0.1 %FS	0.25 %	
Bias Stability	TBD	TBD		
Scale Factor Stability	TBD	TBD	TBD	
Noise Density	130 μg/VHz	0.005 °/s/vHz	1.5 mG RMS	
Alignment Error	0.08°	0.08°	0.08°	
Bandwidth	350 Hz	250 Hz		
Sampling Rate	1000 Hz	2000 Hz	100 Hz	100 Hz
IMU Output Rate	1 Hz to 1000 Hz			



Data Outputs

	Data Output	Type-RI	Type-RA	Type-RAM
	Acceleration	٠	•	•
	Angular Rate	٠	•	•
[2]	Magnetic Field	٠	•	•
MU	Pressure	٠	•	•
= p	Ambient Temperature	٠	•	•
ere	Δθ, ΔV Vectors	٠	•	•
Filt	Compensated Acceleration & Angular Rate	٠	•	•
	Runtime Automatic Magnetic Calibration	٠	•	•
	External IMU Sensor Input Support	•	•	•
	Euler Angle (Roll & Pitch & Yaw)		•	•
[2]	Quaternions		•	•
outs	Orientation Matrix		•	•
utp	Pressure Altitude		•	•
F O	Embedded WMM & EGM		•	•
Ä	True & Magnetic North Information		•	•
	Heave Calculation			•
[2]	OPUS Proprietary Firmware Interface	•	•	•
era	NMEA0183	٠	•	٠
Gen	NMEA2000			•

Integration & Operating Conditions

Specification	Condition	
Input Voltage (V _{in})	$4.5V \le V_{in} \le 15V$	
Power Consumption	220 mW (typ.)	
Operating Temperature	TBD	
Ingress Protection (IP)	-	
Temperature Compensation	Full working range	
Interfaces	✓ CAN FD	
	✓ UART	
	✓ RS232	
	✓ USB 2.0	
Output Data Rate (ODR _{max})	Up to 1kHz	
Protocol	✓ OPUS Proprietary Firmware Interface	
	✓ NMEA 0183 ^[3]	
	✓ NMEA 2000 (see Data Outputs) ^[3]	
SDK Support	✓ C/C++ API's for Embedded Development ^[3]	

^[2] Some of listed outputs are hardware ready and are going to be implemented with the following firmware updates via **OPUSDeviceManager** software. Please contact our technical team for further information.
^[3] NMEA0183, NMEA2000 and C/C++ API's are under development and will be released in shortly. User's can always contact our technical team or visit our Website in order to get recent updates.

AHRS Performance

Specification	Value
Pitch / Roll (Static)	0.5°
Pitch / Roll (Dynamic)	0.8°
Heading (Static)	1°
Heading (Dynamic)	2°

Pressure Altimeter

Specification	Value
Altitude Range	0 to 10,000 meters
Resolution	0.01 mBar
Relative Accuracy	± 0.05 mBars

Physical Information

Interface	General Specifications
Dimensions	30 mm x 30 mm x 10 mm
Weight	TBD
Enclosure	Anodized Aluminum
Connector	Harting 15150122601000

Mechanical Drawing







M3 CAPTIVE SCREW

CONNECTOR: HARTING HAR-FLEX 15150122601000 MATING CONNECTOR: HARTING 15290122502000

NOTCH DESIGNATES PIN 1



