ORIENTUS
MEMS AHRS

Orientus is a ruggedised miniature sensor and AHRS that provides accurate orientation under the most demanding conditions. It combines temperature calibrated accelerometers, gyroscopes and magnetometers in a sophisticated fusion algorithm to deliver accurate and reliable orientation.

PERFORMANCE

- 0.2 ° Roll and Pitch
- 0.5 ° GNSS Heading
- 3 °/hr Gyroscope Bias
- 1000 Hz Update Rate

KEY FEATURES

- Linear Acceleration Compensation
- Magnetic Interference Mitigation
- Low Weight: 25 grams
- Small Size: 30 x 30 x 24 mm
- Low Power: 0.325 W

APPLICATIONS

AIR
- UAV Orientation
- Stabilisation & Pointing

LAND
- Robotic Control & Orientation
- Stabilisation & Pointing
- Human Movement

SEA
- AUV Orientation
- ROV Orientation
Orientus features fully automatic magnetic calibration that updates every time the unit moves and removes all requirements on a manual calibration process. This provides reliable accurate heading through changing environments.

**HIGH PERFORMANCE MEMS**

Orientus contains high performance MEMS sensors that are put through Advanced Navigation's intensive 8 hour temperature calibration process. This provides the highest accuracy possible from this sensor class and outputs consistent accuracy over the full temperature range from -40°C to 85°C.

**AUTOMATIC MAGNETIC CALIBRATION**

Orientus uses an innovative algorithm to compensate for linear accelerations. This allows Orientus to maintain accurate roll and pitch through short term linear accelerations that typically cause significant errors in competitors systems. For long term linear accelerations Orientus supports the addition of an external GNSS receiver for full acceleration compensation.

**HIGH UPDATE RATE**

Orientus's internal filter runs at 1000 Hz and data can also be output at this rate over high speed RS232. This allows for control of dynamically unstable platforms.

**LINEAR ACCELERATION COMPENSATION**

Orientus has been designed from the ground up for mission critical control applications where reliability is very important. It is built on top of a safety oriented real time operating system and all software is designed and tested to safety standards with fault tolerance in mind. The hardware is designed and manufactured to mil standards.

**RELIABILITY**

Orientus’s internal filter runs at 1000 Hz and data can also be output at this rate over high speed RS232. This allows for control of dynamically unstable platforms.
### SPECIFICATIONS

#### ORIENTATION

- **Roll & Pitch Accuracy (Static)**: 0.2 °
- **Heading Accuracy (Static)**: 0.5 °
- **Roll & Pitch Accuracy (Dynamic)**: 0.6 °
- **Heading Accuracy (Dynamic)**: 1.0 °
- **Orientation Range**: Unlimited
- **Internal Filter Rate**: 1000 Hz
- **Output Data Rate**: Up to 1000 Hz
- **Latency**: 0.3 ms

#### HARDWARE

- **Operating Voltage**: 4 to 36 V
- **Input Protection**: ± 60 V
- **Power Consumption**: 0.325 W
- **Operating Temperature**: -40 °C to 85 °C
- **Environmental Protection**: IP68, MIL-STD-810G
- **MTBF**: 380,000 hrs
- **Shock Limit**: 2000 g
- **Dimensions (excluding tabs)**: 30 x 30 x 24 mm
- **Dimensions (including tabs)**: 30 x 40.6 x 24 mm
- **Weight**: 25 grams

#### COMMUNICATION

- **Interface**: RS232
- **Speed**: 4800 to 1M baud
- **Protocol**: AN Packet Protocol, NMEA or TSS
- **Peripheral Interfaces**: 2x GPIO and Auxiliary RS232
- **GPIO Level**: 5 V
- **GPIO Functions**: NMEA input / output, Novatel input, AN Packet Protocol input / output, Magnetometers disable, Set zero orientation, Packet trigger, u-blox input, TSS output, Custom (contact us)

#### SENSORS

<table>
<thead>
<tr>
<th>SENSOR</th>
<th>ACCELEROMETERS</th>
<th>GYROSCOPES</th>
<th>MAGNETOMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range (dynamic)</td>
<td>± 2 g</td>
<td>± 250 °/s</td>
<td>± 2 G</td>
</tr>
<tr>
<td></td>
<td>± 4 g</td>
<td>± 500 °/s</td>
<td>± 4 G</td>
</tr>
<tr>
<td></td>
<td>± 16 g</td>
<td>± 2000 °/s</td>
<td>± 8 G</td>
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<tr>
<td>Bias Instability</td>
<td>20 ug</td>
<td>3 °/hr</td>
<td>-</td>
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<tr>
<td>Initial Bias</td>
<td>&lt; 5 mg</td>
<td>&lt; 0.2 °/s</td>
<td>-</td>
</tr>
<tr>
<td>Initial Scaling Error</td>
<td>&lt; 0.06 %</td>
<td>&lt; 0.04 %</td>
<td>&lt; 0.07 %</td>
</tr>
<tr>
<td>Scale Factor Stability</td>
<td>&lt; 0.06 %</td>
<td>&lt; 0.05 %</td>
<td>&lt; 0.09 %</td>
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<tr>
<td>Non-linearity</td>
<td>&lt; 0.05 %</td>
<td>&lt; 0.05 %</td>
<td>&lt; 0.08 %</td>
</tr>
<tr>
<td>Cross-axis Alignment Error</td>
<td>&lt; 0.05 °</td>
<td>&lt; 0.05 °</td>
<td>&lt; 0.05 °</td>
</tr>
<tr>
<td>Noise Density</td>
<td>100 ug/√Hz</td>
<td>0.004 °/√Hz</td>
<td>210 uG/√Hz</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>400 Hz</td>
<td>400 Hz</td>
<td>110 Hz</td>
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