



***OxTS Product
Disclaimer***

AV200

Measure with confidence



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1 *Product overview*

The AV200 is an inertial navigation system (INS) combining survey-grade GNSS receivers with a custom designed IMU to measure precise position and motion data. Additionally, the device includes 32 GB data storage and an on-board processor running the real-time strapdown navigator and Kalman filter.



2 Intended use

The AV200 has been designed as a general-purpose product for automotive, autonomy, and robotics applications. It is capable of logging positioning and dynamics data as a passive measurement device, and/or outputting the data in real-time as part of an active control system. When used as part of a control system it should be considered a Safety Element out of Context (SEooC). Appropriate steps should be taken by the System Integrator to ensure that the control system as a whole meets the required functional safety standards, with the AV200 supported by additional independent sensors and modules.



3 Product limitations and disclaimer

- 3.1. You must ensure that your use and application of the AV200 is in accordance with any guidance or instructions issued by OxTS and all applicable local and national laws plus any industry standards and regulations.
- 3.2. You acknowledge that you are solely responsible for conducting your own risk and safety assessment whenever the AV200 is used which should include provision for ensuring that any operatives under your control receive adequate instruction, information and training, and are competent to conduct the operations in question.
- 3.3. Use of the AV200 does not enable or guarantee autonomous driving or operating capabilities and all vehicles require active supervision (whether in person or remotely) of an experienced operator.
- 3.4. From time to time we may issue Firmware updates for the AV200, such updates may provide fixes or improvements to issues such as, safety, reliability, security and performance. We highly recommend that you install any Firmware updates as soon as possible after they are released.
- 3.5. We recommend that all vehicles fitted with the AV200 are also fitted with independent "instant kill" capabilities to enable the operator to bring the vehicle to an immediate stop if a problem occurs.
- 3.6. Before using the AV200, you must ensure that you have read and understood all relevant operating and installation instructions, carried out any required or recommended maintenance, and undertaken suitable safety and operational checks.
- 3.7. Localisation data output by the AV200 has associated accuracy estimates calculated by the Kalman filter, as well as innovation indicators to show agreement between the independent GNSS and IMU data sources. These measurements should be monitored closely and you should use these measurements to determine and provide your own confidence level for the data output that is appropriate to your use case and that prevents low confidence data being used in a situation that could lead to hazardous behaviour. See Section 4 for more details of these measurements.
- 3.8. Many factors can impact the performance of the AV200, causing the system to be unable to function as intended. These include but are not limited to: poor satellite visibility (due to obstructions, elevation mask etc.); interference (from nearby electronics or external third parties); improper installation of the device; improper installation of the GNSS antennas; incorrect configuration; excessive shock or vibration; extreme temperatures.
- 3.9. The AV200 undergoes a factory calibration process that adjusts the error model and sensor characteristics to ensure each device meets a minimum level of performance. While ageing tests have been performed to check the performance remains within the listed specification after 8 years, the factory calibration performance is valid for 2 years.
- 3.10. We do not separately verify or evaluate the outputs of the AV200 and you must not use the AV200 or refer to us in a manner that implies a relationship or affiliation with, sponsorship, or endorsement of you, your statements or results, or your products by us.



4 Accuracy measurements for confidence estimation

4.1 Accuracy definition

These measurements are an instantaneous estimate of the device's precision. In a correctly configured system, including accurate positioning of all relevant base stations, we expect this to approach the accuracy of the device.

4.2 NCOM

The OxTS navigation output format NCOM includes a batch of messages that provides status information of the device and accuracy measurements of the localisation data. Refer to the NCOM description manual for full details.

Status channels of note include, but are not limited to, the following:

Table 1: NCOM accuracy status messages

Batch S channel value	Description
1	Kalman filter innovations set 1 (position, velocity, orientation)
3	Position accuracy
4	Velocity accuracy
5	Orientation accuracy
20	Differential correction information
23	System up-time, number of consecutive GNSS rejections.
37	Heading misalignment, number of satellites used in navigation solution

When using Output Smoothing, there may be a delay between the reported accuracies and the system response. In this case, the NCOM message UMAC status should be used. The UMAC status provides a single measurement that summarises the horizontal position accuracy of the device in a more responsive "worst-case" output. The UMAC status byte can be found in channel 3 (position accuracy) of Batch S in NCOM. Table 2 lists the details of the UMAC status byte.



Table 2: UMAC status description

Value	Status	Description
0	Error	Problem with system
1	Time Valid	Waiting for GNSS lock
2	Speed Threshold	Ready to initialise
3	Output Lag	Not yet real-time
4	Aligning Axis	Heading realignment completed
5	Bad Position	Accuracy worse than 10 m
6	Poor Position	Accuracy 2 m to 10 m
7	SPS Position	Accuracy 50 cm to 2 m
8	Differential Position	Accuracy 10 cm to 50 cm
9	RTK Position	Accuracy better than 10 cm
10	Unknown	Unknown

4.3 NMEA

OxTS products support the NMEA 0183 standard. The standard includes several sentences that provide accuracy measurements and other useful status information. Refer to the NMEA manual for full details.

NMEA sentences of note include, but are not limited to, the following:

Table 3: NMEA accuracy status messages

Sentence identifier	Description
GST	GPS Pseudorange Noise Statistics
PASHR	Proprietary Heading, Pitch, Roll, Heave measurements
GSA	GPS DOP and Active Satellites



5 *Limitation of liability*

- 5.1. We do not exclude or limit in any way our liability to you where it would be unlawful to do so. This includes (a) liability for death or personal injury caused by our negligence or the negligence of our employees, agents or subcontractors, (b) for fraud or fraudulent misrepresentation, or (c) for breach of your legal rights in relation to our products.
- 5.2. You acknowledge that we shall not be responsible for any loss of or damage:
 - 5.2.1. arising out of or in connection with any negligence, misuse, mishandling of the AV200 or otherwise caused by you or your officers, employees, agents and contractors;
 - 5.2.2. to the extent that it could have been avoided or reduced if you had complied with the instructions and recommendations set out in the Warranty section of the user manual and Product limitations and disclaimer section above; or
 - 5.2.3. to the extent that it could have been avoided or reduced if the AV200 had been updated to the latest Firmware release; or
 - 5.2.4. that comprises (a) loss of profit, (b) loss of revenue, (c) loss of business (d) loss or corruption of data, or (e) indirect or consequential loss or damage, in each case, however caused, even if foreseeable.
- 5.3. To the extent permitted by law, our total liability to you shall not exceed the value of the charges you have paid.



6 Customer support

For any questions related to the material in this document or for support while integrating and operating the AV200, please contact the OxTS Technical Support team at: support@oxts.com.

General support and troubleshooting tips can also be found on our online knowledge base and help centre at: [OxTS Support](#).



7 Revision history

Table 4: Revision history

Revision	Comments
220727	First release





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