

# SPEEDBOX & SPEEDBOX MINI - Non-contact Speed Sensors



The **SPEEDBOX** and **SPEEDBOX MINI** are very high accuracy non-contact speed sensors which have been designed for professional automotive testing as well as other industrial and high-end motorsport applications. They output a low latency, non-interpolated speed measurement comprised of GPS and inertial data combined using an adaptive filter for exceptional performance even in environments where accuracy of GPS-only sensors is severely degraded.

- Highly accurate: 0.02m/s speed accuracy.
- 20Hz **PurePhase** GPS developed by Race Technology specifically for automotive testing.
- 3 axis accelerometer (optional high accuracy IMU upgrade: 10g, 300 degrees/s).
- Accelerometers combined with GPS create maximum accuracy even during short GPS signal drop-outs.
- Self-optimising Kalman filter used to maintain GPS and accelerometer data.
- 4 configurable analogue ports, offering inputs and outputs for combined speed, GPS or acceleration data. Easily accessible on LEMO connectors on **SPEEDBOX**.
- Digital pulse output for speed & distance measurement.
- Trigger input for data synchronisation with external events.
- Serial and USB ports for data output, in uBlox, Race Technology format, ASCII messages in NMEA format.
- Fully configurable CAN output.
- Live Monitor software for live script based testing.

The high accuracy 20Hz **PurePhase** GPS solution is optimised for speed measurement, outperforming even top of the range 'survey-grade' GPS receivers in this respect. This unique GPS technology outperforms "GPS-only sensors", offering lower noise, lower latency and superior bandwidth, and is far more resistant to drop-outs. It offers an ideal replacement/upgrade for 5th wheel, optical and GPS-only sensors.

GPS positional accuracy can be improved to within the range of 2-3cm by combining the **SPEEDBOX** with the GPS2 product.

The cases are designed to stack securely with other system components, allowing full systems to be integrated and installed as complete connected systems. This makes the transition from setting up on the bench to testing in the vehicle quick and easy.



**Race Technology**  
www.race-technology.com

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## SPEEDBOX & SPEEDBOX MINI

Are suitable for most straight line testing: pedal triggered brake tests, measuring deviation from a line under braking, acceleration timings, general high accuracy accel/speed measurement for tyre testing etc and also for some special applications like gradient measurement.

	SPEEDBOX	SPEEDBOX MINI *	Options			
			+IMU	+RTK	+INS Dual Antenna	+INS Single Antenna
<b>Accelerations</b>	200Hz, 0.1m/s <sup>2</sup>	200Hz, 0.1m/s	200Hz, 0.05m/s <sup>2</sup>	200Hz, 0.1m/s <sup>2</sup>	200Hz, 0.01m/s <sup>2</sup>	200Hz, 0.01m/s <sup>2</sup>
<b>Speed</b>	200Hz, 0.02m/s	200Hz, 0.02m/s	200Hz, 0.015m/s	200Hz, 0.02m/s	200Hz, 0.015m/s	200Hz, 0.015m/s
<b>Distance</b>	200Hz, 3cm in 40m	200Hz, 3cm in 40m	200Hz, 3cm in 40m	200Hz, 3cm in 40m	200Hz, 3cm in 40m	200Hz, 3cm in 40m
<b>Position</b>	20Hz, 3m (note 1)	20Hz, 3m (note 1)	20Hz, 3m (note 1)	20Hz, 3m (note 1)	200Hz, 2m (note 1)	200Hz, 2m (note 1)
<b>Roll / Pitch / Yaw rate</b>			200Hz, 0.1deg/s		200Hz, 0.01deg/s	200Hz, 0.01deg/s
<b>Yaw</b>				20Hz, 0.2deg	200Hz, 0.08deg	200Hz, 0.08deg
<b>Roll / Pitch</b>				20Hz (note 2), 0.6deg	200Hz, 0.04deg	200Hz, 0.04deg
<b>Price Comparison</b>	\$\$\$	\$\$	\$\$\$\$	\$\$\$\$	\$\$\$\$\$\$\$	\$\$\$\$\$\$\$

The figures given in the table are for 50% CEP accuracy, with a good GPS signal.

\* +IMU option not available on SPEEDBOX MINI.

Note 1: Positional accuracy can be improved to 2-3cm using the GPS2 RTK product in combination with SPEEDBOX systems.

Note 2: for the RTK option only either Pitch or Roll is available at one time, not both. For the INS option, all outputs are available simultaneously.

Note that 20Hz measurements need a GPS fix to be valid, all 200Hz measurements are from the inertial sensors and robust to GPS outages making them far more suited to highway testing.

The following options are available:

### +IMU

Using an internal, high accuracy inertial measurement unit to give additional angular velocities. The IMU option also upgrades the 3 axis accelerometers to measure up to 10g with very high accuracy. Measure angular velocities (roll, pitch and yaw rates) up to 300 degrees/s. The SPEEDBOX can be specified with both IMU and RTK options on the same unit. Option not available on SPEEDBOX MINI.

### +RTK

This adds slip angle measurement to the standard SPEEDBOX. Roll and pitch measurements are also possible but with limited accuracy.

### +INS Single Antenna

Very high accuracy, full vehicle attitude measurement for all types of brake testing and dynamic chassis development. Also much greater robustness to poor GPS data conditions and test accuracy estimates.

### +INS Dual Antenna

This adds the ability to initialise when stationary to the SPEEDBOX, ideal for applications where the vehicle can not easily be moved through dynamic manoeuvres to get the system initialised, such as on mining trucks or other large vehicles.

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