

# VBOX 3iS – 100 Hz GNSS/INS System (RLVB3iS-V1)



The VBOX 3iS is a compact GNSS-aided inertial navigation system (INS) with a built-in OLED display.

Combining wheel speed and survey-grade 100 Hz GNSS measurements with an Inertial Measurement Unit, the VBOX 3iS offers accurate position, speed, acceleration, attitude, and angular rate data.

In GNSS denied environments, such as tunnels and deep urban canyons, combining wheel speed information with GNSS and inertial data in a Kalman filter yields a significant improvement in the accuracy of the estimated speed and position.

Only 13 cm in length, the sensor is easy to mount and transport, making it ideal for automotive, motorsport, marine, and telematics testing and development.



## Features

- High Performance 100 Hz GPS and GLONASS receiver
- Integrated Inertial Measurement Unit
- Built in display for easy configuration and diagnostics
- CAN bus output includes speed, body heading, pitch and roll angles, brake stop distance, radius of turn, accelerometer, and gyro data
- Serial output of NMEA and attitude channels
- User configurable digital output
- Virtual lap beacon output
- Rugged Deutsch ASDD Autosport connector
- High quality aluminium enclosure
- IP67 rated: water + dust proof
- Wide 7.5 V – 30 V operating range and low current consumption
- Oversampled event marker to precisely capture the start of tests such as braking

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## Inputs

Unit Power	
Input Voltage Range	7.5 V – 30 V DC
Power Consumption	7.5 W max
Digital Input	
Input Function	Brake event trigger/ track marker
CAN Input	
Input Function	Wheel speed input
RS232 Input	
Input Function	Configuration/ External IMU



## Outputs

CAN Bus	
Output Data Rate	125 kbit/s, 250 kbit/s, 500 kbit/s & 1 Mbit/s selectable baud rate. Software controlled CAN termination.
Data available	<p><b>Outputs:</b> Satellite count, time, position, speed, heading, height, vertical velocity, longitudinal acceleration, lateral acceleration, distance, yaw angle (body), roll angle, pitch angle, X acceleration, Y acceleration, Z acceleration, pitch rate, roll rate, yaw rate</p> <p><b>Results:</b> Trigger event time, trigger speed, start speed, end speed, deceleration test time, lap time, split time, radius of turn.</p>
RS232	
Output Data Rate	Up to 100 Hz
Digital Output	
Signal Levels	Low = 0 V, High = 5 V, Max. frequency 4.4 kHz
Output Type	Speed, 1 PPS or Lap Beacon
GNSS Antenna Supply	
Supply Voltage	5 V DC

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## GNSS Specifications

Velocity		Absolute Positioning (RMS)	
Accuracy	0.1 km/h (averaged over 4 samples)	Accuracy* (Standalone)	V: 1.8 m; H: 1.2 m
Update rate	100 Hz	Accuracy* with SBAS	V: 1.2 m; H: 0.8 m
Maximum velocity	1200 km/h (655 knots)	Accuracy* with DGPS	V: 0.5 m; H: 0.3 m
Minimum velocity	0.1 km/h		
Resolution	0.0185 km/h (0.01 knots)	Update rate	100 Hz
Latency	15.5 ms (fixed)	Resolution	1.8 mm

Distance		Acceleration	
Accuracy	0.05 % (<50 cm per km)	Accuracy	0.50 %
Update rate	100 Hz	Maximum	20 g
Resolution	0.078 mm	Resolution	0.01 g
		Update rate	100 Hz

Heading		Time	
Resolution	0.01°	Resolution	0.01 s
Update rate	100 Hz	Accuracy	30 ns

Brake Stop Accuracy (Trigger Activated)			
Accuracy	±1.8 cm**		

## Definitions

\* Specifications will vary depending on the number of satellites used, obstructions, satellite geometry (PDOP), multipath effects, and atmospheric conditions. For maximum system accuracy, always follow best practices for GNSS data collection.

\*\* Based on <50 m brake stop distance.

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## IMU Specifications

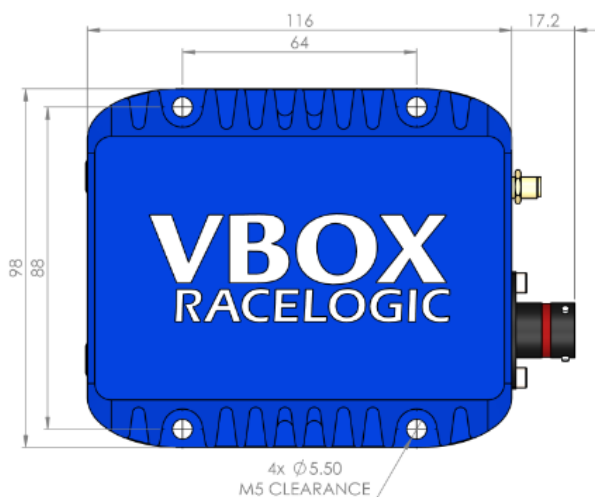
	Gyroscopes (Angular rate sensors)	Accelerometers
Dynamic range	$\pm 450$ °/s	$\pm 20$ g
Nonlinearity	0.01 % of full scale	0.1 % of full scale
Resolution	20 bits (0.00085 °/s)	20 bits (0.00004 mg)
Bandwidth	50 Hz	50 Hz
Noise density	0.01 °/s/√Hz	60 µg/√Hz
Bias stability	0.0028 °/s	15 µg
Bias repeatability (1 year)	0.2 °/s	0.005 g

## Roll and Pitch Angle Accuracy

Attitude	Accuracy (RMS)
Pitch Angle	0.06°
Roll Angle	0.06°

## Environmental and Physical

Environmental and physical			
Weight	Approx. 480 g	Operating temperature	-20°C to +70°C
Size	133.2 mm x 98 mm x 37.5 mm	Storage temperature	-40°C to +85°C
IP rating	IP 67		



# VBOX 3iS – 100 Hz GNSS/INS System (RLVB3iS-V1)



## Package Contents

Description	Product Code
1x VBOX 3iS 100 Hz GNSS & INS Single Antenna Unit	VB3IS-V1
1x GPS/GLONASS L1 antenna with detachable RG 174 SMA-SMA cable (4 m)	RLACS156
1x Carry Case	RLACS106
1x Serial Configuration cable (2m)	RLCAB001
1x ISO/IEC 17025:2017 Calibration Certificate	RLCALUKAS
<b>Supplied separately</b>	
VBOX 3iS Speed Only Interface Cable (1.2 m)	RLCAB128
VBOX 3iS Brake Testing Interface Cable (1.2 m)	RLCAB129
VBOX 3iS External IMU Interface Cable (3 m)	RLCAB131

## Hardware & Software Support

Support	
Lifetime Support Contract	Valid for a minimum of 5 years from the date of purchase and limited to the original purchaser. Contract includes telephone/ email technical support provided by local VBOX distributor and firmware/ software upgrades (where applicable).