

# VBOX 3iS – 100 Hz GNSS/INS System (RLVB3iS-V2)



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

- 100 Hz GPS/GLONASS receiver
- Integrated Inertial Measurement Unit
- CAN wheel speed data integration for enhanced accuracy in areas with poor satellite visibility
- RS232, CAN, and Ethernet port
- Connects to any data logger via Serial or CAN
- Pitch and roll angles with IMU integration
- $\pm 1.8$  cm brake distance accuracy
- Rugged Deutsch ASDD Autosport connector
- High resolution event marker
- Built in display for easy configuration and diagnostics
- IP67 rated: water + dust proof
- Free lifetime support

# VBOX 3iS – 100 Hz GNSS/INS System (RLVB3iS-V2)



## 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
Ethernet	
Output Data Rate	100 Hz
Digital	
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

# VBOX 3iS – 100 Hz GNSS/INS System (RLVB3iS-V2)



## 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	Accuracy* with DGPS	V: 0.5 m; H: 0.3 m
Minimum velocity	0.1 km/h		
Resolution	0.01 km/h	Update rate	100 Hz
Latency	20 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	1 cm	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.

# VBOX 3iS – 100 Hz GNSS/INS System (RLVB3iS-V2)



## IMU Specifications

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

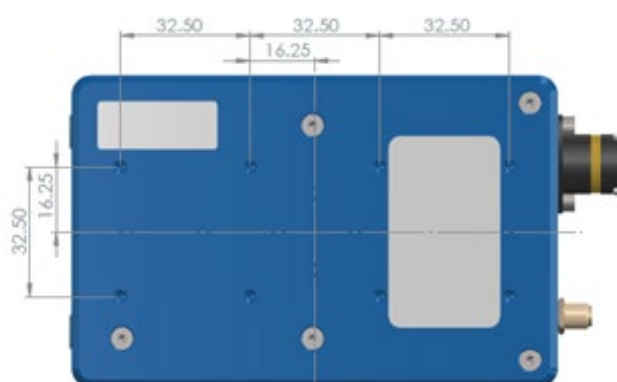
## Roll and Pitch Angle Accuracy

These are IMU derived (IMU Kalman Filter enabled).

	Pitch Angle	Roll Angle
Accuracy (RMS)	0.06 $^\circ$	0.06 $^\circ$

## Environmental and Physical

Environmental and physical			
Weight	Approx. 480g	Operating temperature	-20 $^\circ\text{C}$ to +70 $^\circ\text{C}$
Size	139.21 x 78.5 x 38 mm	Storage temperature	-40 $^\circ\text{C}$ to +85 $^\circ\text{C}$
IP rating	IP67		



## Package Contents

# VBOX 3iS – 100 Hz GNSS/INS System (RLVB3iS-V2)



Description	Product Code
1x VBOX 3iS Single Antenna Unit only	VB3IS-V2
1x GPS/GLONASS L1 antenna with detachable RG 174 SMA-SMA cable (4 m)	RLACS156
1x Deutsch 23W ASDD - Multiple Connectors	RLCAB163
1x Lemo 2W Plug - Cigar Plug - 2m cable (Power) Screened	RLCAB010LE
1x Serial Configuration cable (2m)	RLCAB001
1x Carry Case	RLACS106
1x Certificate of Calibration - UKAS Accredited Calibration Lab	RLCALUKAS