Speed Sensor Range
VBSS05 – VBSS100RG

The VBOX Speed Sensor Range

Based on a range of high accuracy GPS engines, **VBOX Speed Sensors** offer the ultimate non-contact measurement solution.

With 5Hz, 10Hz, 20Hz, and 100Hz GPS update rate options available, the Speed Sensor range suits a variety of budgets and requirements. All units are also compatible with the **DGPS BaseStation** for increased positional accuracy. When used with the **RTK BaseStation** the VBSS100 with GLONASS + RTK can reach 2cm position accuracy.

The units all have the same small hardware footprint, at only 9cm long, making mounting and transportation easy. The Speed Sensors are perfect for automotive testing, motorsport, marine, telematics, and data-logging applications. The IP66 rating means that each unit is water and dustproof, allowing them to be used in a variety of conditions.

Data output is via CAN Bus, offering easy integration with data loggers and testing applications.
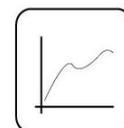
Each speed sensor also features analogue and digital outputs. The analogue output can be assigned to vehicle speed, lateral acceleration, longitudinal acceleration, or lap beacon marker with user selectable scaling. The digital output can be configured as either a digital speed pulse output or a lap beacon marker.
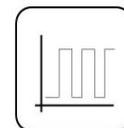
Features

- High Performance GPS Receivers: 5 – 100Hz

- CAN Bus Output of Position, Velocity, Distance, Time, Heading, Height, Vertical Velocity, Longitudinal and Lateral Acceleration, Trigger to zero distance, Trigger time, Trigger speed, Radius of Turn

- RS232 Serial Output of NMEA, position velocity and time

- User Configurable Analogue + Digital Outputs

- Virtual Lap Beacon Output

- Compatible with DGPS Basestation

- Rugged Deutsch ASDD Autosport connector

- High quality aluminium enclosure

- IP66 rated: water + dustproof

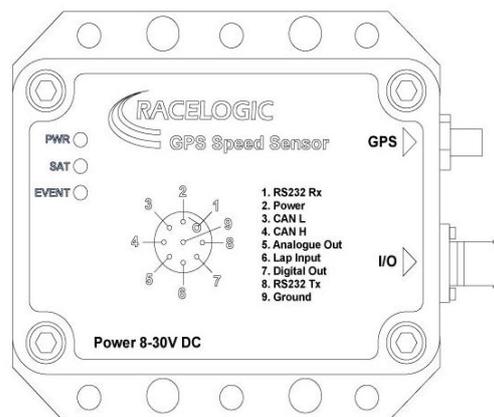- Wide 6.5V – 30V operating range and low current consumption

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Package Contents

RLVBSS*XX*	Speed Sensor Unit. Options: VBSS05, VBSS10, VBSS20, VBSS100 or VBSS100R10
RLVBACS018	GPS Antenna (for use with VBSS05, VBSS10, VBSS20)
RLVBACS001	GPS Magnetic Aerial (for use with VBSS100)
RLACS156	GPS/GLONASS Antenna TW 2400 (for use with VBSS100RG)
VBSSMAN	VBOX Speed Sensor User manual
CDVBSS	VBOX Speed Sensor Software CD

Supplied separately

RLCAB093	VBOX Speed Sensor Interface Cable (Analogue / Digital / CAN / Serial / Power)
RLCAB093-C	VBOX Speed Sensor Interface Cable + 5 way Lemo socket for CAN Communication
RLCAB093-L	VBOX Speed Sensor Interface Cable + 5 way Lemo socket for Serial Communication

Specifications

5Hz Speed Sensor (VBSS05): GPS Specifications

Velocity		Distance	
Accuracy	0.2 Km/h	Accuracy	0.05% (<50cm per Km)
Units	Km/h or Mph	Units	Metres / Feet
Update rate	5 Hz	Update rate	5 Hz
Maximum velocity	1000 Mph	Resolution	1cm
Minimum velocity	0.1 Km/h	Height accuracy	10 Metres 95% CEP**
Resolution	0.01 Km/h		
Latency	>160ms		
Absolute Positioning		**Time**	
Accuracy	5m 95% CEP**	*Accel/Brake Test (MFD):*	
Accuracy w/ SBAS DGPS	1.8m 95% CEP**	Resolution	0.01 s
Accuracy w/ BaseStation RTCM DGPS	40cm 95% CEP**	Accuracy	0.01 s
		Lap Timing (OLED):	
Update rate	5 Hz	Resolution	0.01 s
Resolution	1.8 cm	Accuracy	0.01 s*
Heading		**Acceleration**	
Resolution	0.01°	Accuracy	1.00%
Accuracy	0.2°	Maximum	4 G
		Resolution	0.01 G
		Update rate	5 Hz
Brake stop Accuracy (Trigger Activated)			
Accuracy	N/A		

Definitions

* Not using DGPS and crossing the start/finish line at 100km/h
** 95% CEP (Circle of Error Probable) means 95% of the time the position readings will fall within a circle of the stated radius.

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10Hz Speed Sensor (VBSS10): GPS Specifications

Velocity			**Distance**		
Accuracy	0.1 Km/h		Accuracy	0.05% (<50cm per Km)	
Units	Km/h or Mph		Units	Metres / Feet	
Update rate	10 Hz		Update rate	10Hz	
Maximum velocity	1000 Mph		Resolution	1cm	
Minimum velocity	0.1 Km/h		Height accuracy	6 Metres	95% CEP**
Resolution	0.01 Km/h		Height accuracy with DGPS	2 Metres	95% CEP**
Latency	41.5ms				
Absolute Positioning			**Time**		
Accuracy	3m 95% CEP**		*Accel/Brake Test (MFD):*		
Accuracy with SBAS DGPS	1.8m 95% CEP**		Resolution	Resolution	
Accuracy w/ Basestation RTCM DGPS	40cm 95% CEP**		Accuracy	Accuracy	
Accuracy with Basestation DGPS + GPS Upgrade (RLVBUP30)	20cm 95% CEP**		*Lap Timing (OLED):*		
Update rate	10 Hz		Resolution	0.01 s	
Resolution	1.8 cm		Accuracy	0.01 s*	
Heading			**Acceleration**		
Resolution	0.01°		Accuracy	0.50%	
Accuracy	0.1°		Maximum	20 G	
			Resolution	0.01 G	
			Update rate	10 Hz	
Brake Stop Accuracy (Trigger Activated)					
Accuracy	±20cm				

Definitions

* Not using DGPS and crossing the start/finish line at 100km/h
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20Hz Speed Sensor (VBSS20): GPS Specifications

Velocity

Accuracy	0.1 Km/h
Units	Km/h or Mph
Update rate	20 Hz
Maximum velocity	1000 Mph
Minimum velocity	0.1 Km/h
Resolution	0.01 Km/h
Latency	41.5ms

Absolute Positioning

Accuracy	3m 95% CEP**
Accuracy with SBAS DGPS	1.8m 95% CEP**
Accuracy w/ Basestation RTCM DGPS	40cm 95% CEP**
Accuracy with Basestation DGPS + GPS Upgrade (RLVBUP30)	20cm 95% CEP**
Update rate	10 Hz
Resolution	1.8 cm

Heading

Resolution	0.01°
Accuracy	0.1°

Brake Stop Accuracy (Trigger Activated)

Accuracy	±10cm

Distance

Accuracy	0.05% (<50cm per Km)
Units	Metres / Feet
Update rate	20Hz
Resolution	1cm
Height accuracy	6 Metres 95% CEP**
Height accuracy with DGPS	2 Metres 95% CEP**

Time

Accel/Brake Test (MFD):	
Resolution	Resolution
Accuracy	Accuracy
Lap Timing (OLED):	
Resolution	0.01 s
Accuracy	0.01 s*

Acceleration

Accuracy	0.50%
Maximum	20 G
Resolution	0.01 G
Update rate	20 Hz

Definitions

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100Hz Speed Sensor (VBSS100): GPS Specifications

Velocity

Accuracy	0.1 Km/h
Units	Km/h or Mph
Update rate	100 Hz
Maximum velocity	1000 Mph
Minimum velocity	0.1 Km/h
Resolution	0.01 Km/h
Latency	6.75ms

Distance

Accuracy	0.05% (<50cm per Km)
Units	Metres / Feet
Update rate	100Hz
Resolution	1cm
Height accuracy	6 Metres 95% CEP**
Height accuracy with DGPS	2 Metres 95% CEP**
Height accuracy with RTK DGPS	2 cm 95% CEP**

Absolute Positioning

Accuracy	3m 95% CEP**
Accuracy with SBAS DGPS	>1.8m 95% CEP**
Accuracy with BaseStation RTCM DGPS	40cm 95% CEP**
Update rate	100 Hz
Resolution	1.8 cm

Time

Accel/Brake Test (MFD):

Resolution	Resolution
Accuracy	Accuracy

Lap Timing (OLED):

Resolution	0.01 s
Accuracy	0.05 s*

Heading

Resolution	0.01°
Accuracy	0.1°

Acceleration

Accuracy	0.50%
Maximum	20 G
Resolution	0.01 G
Update rate	100 Hz

Brake Stop Accuracy (Trigger Activated)

Accuracy	±1.8 cm

Definitions

* Not using DGPS and crossing the start/finish line at 100km/h
** 95% CEP (Circle of Error Probable) means 95% of the time the position readings will fall within a circle of the stated radius.

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100Hz Speed Sensor (VBSS100RG): GPS/ GLONASS + RTK Specifications

Velocity		**Distance**	
Accuracy	0.1 Km/h	Accuracy	0.05% (<50cm per Km)
Units	Km/h or Mph	Units	Metres / Feet
Update rate	100 Hz	Update rate	100Hz
Maximum velocity	1000 Mph	Resolution	1cm
Minimum velocity	0.1 Km/h	Height accuracy	6 Metres 95% CEP**
Resolution	0.01 Km/h	Height accuracy with DGPS	2 Metres 95% CEP**
Latency	6.75ms	Height accuracy with RTK DGPS	2 cm 95% CEP**

Absolute Positioning		**Time**	
Accuracy	3m 95% CEP**	*Accel/Brake Test (MFD):*	
Accuracy with SBAS DGPS	>1.8m 95% CEP**	Resolution	Resolution
Accuracy with BaseStation RTCM DGPS	40cm 95% CEP**	Accuracy	Accuracy
Accuracy with RTK DGPS	2cm 95% CEP**		
Update rate	100 Hz	*Lap Timing (OLED):*	
Resolution	1.8 cm	Resolution	0.01 s
		Accuracy	0.05 s*

Heading		**Acceleration**	
Resolution	0.01°	Accuracy	0.50%
Accuracy	0.1°	Maximum	20 G
		Resolution	0.01 G
		Update rate	100 Hz

Brake Stop Accuracy (Trigger Activated)	
Accuracy	±1.8 cm

Definitions

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Outputs

CAN Bus

Output Data Rate	125Kbit, 250Kbit, 500Kbit & 1Mbit selectable baud rate. Un-terminated CAN node.
Data available	Position, vehicle speed, heading, lateral acceleration, longitudinal acceleration, satellite count, time, radius of turn, altitude.

RS232

Output Data Rate	10Hz
Data Available	NMEA $GPGGA and $GPVTG messages at 115200Baud

Analogue

Output Data Rate	0 to 5v DC
Data Available	Either Speed, Lateral Acceleration, Longitudinal Acceleration, or Lap Beacon

Digital Output

Output Data Rate	Low = 0v, High = 5v, 10-1000 pulses per metre, Max frequency 4.4Khz
Data Available	Speed or Lap Beacon

Inputs

Power

Input Voltage range	6.5v – 30v DC
Power	3.7w Max (except VBSS05: 2w Max)
GPS Antenna	3V Active Antenna (inc)
Digital Input	Cold Start Activate / Set Lap beacon Position
LED	Power, Satellite Count, Event Out

Environmental and physical

Weight	Approx 250g (Except VBSS05: 190g)	Operating temp Storage temp	-30˚C to +70˚C -40˚C to +85˚C
Size	90mm x 65mm x 31.85mm	Connectors	Deutsch ASDD Autosport Rated IP66

Hardware / Software Support

Hardware	One Year Support Contract
Software	Lifetime Support Contract: valid for a minimum of 5 years from the date of purchase and limited to original purchaser. Contract includes telephone / email technical support provided by local VBOX distributor and firmware / software upgrades where applicable.

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