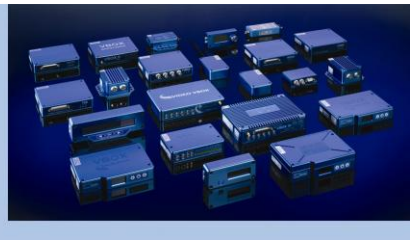
VBOX 3i
100Hz GPS Datalogger



VBOX 3i is the most powerful GPS data logging system built by Racelogic. Using a new GPS engine, VBOX 3i logs data 100 times a second, and features a 400MHz power PC processor. With IMU integration, USB and Bluetooth connectivity, compact flash card logging, and audio functionality for voice tagging, VBOX 3i represents a flexible solution to a range of testing requirements.

For accurate testing even in areas where view of the sky is obstructed, VBOX 3i has the ability to take the information from a Racelogic IMU (inertial measurement unit), pictured below, and combine this with the GPS data in real time to improve the quality of the measured parameters. The three accelerometers and three gyros inside the IMU are used to keep track of the attitude of the vehicle and will greatly increase the velocity and position accuracy during periods when satellite visibility is poor.

When used with an optional DGPS Basestation, VBOX 3i is capable of achieving 40cm 95% CEP positional accuracy. This enables users to measure typical parameters during all types of, acceleration, deceleration, braking, ABS and ESP testing, handling manoeuvres, and many other types of high dynamic testing.

In line with previous VBOX models, VBOX 3i is compatible with all existing peripherals including the Multifunction display, ADC03, FIM03, TC8, and Yaw rate sensor.

- Non-contact 100Hz speed and distance measurement using GPS
- Very low latency: 6.75ms
- 4 x 24bit differential analogue input channels with ±50v input range and synchronous capture
- Brake/Event Trigger input of 10ns resolution.
- 2 x CAN Bus interface for data input & output
- RS-232 serial interface
- USB Interface
- Bluetooth Interface
- Audio voice tagging
- Microphone headset included
- Data logged to Compact Flash memory card
- 2 x 16bit User configurable analogue outputs
- 2 x Digital outputs
- User configurable logging conditions
- Logging rate selectable to 100Hz, 50Hz, 20Hz, 10Hz, 5Hz, 1Hz
- Wide 7V to 30V operating range
- Low current consumption
- Positional accuracies of 2cm with RTK basestation

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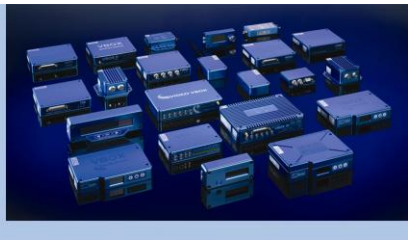


Features

GPS

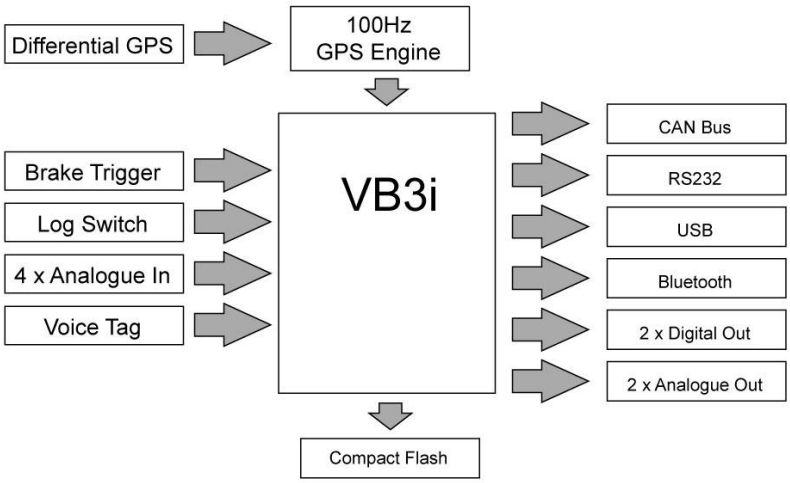
VBOX 3i features a powerful new GPS engine capable of providing 100Hz update rate of all GPS parameters including velocity, heading and position. Velocity and heading data are calculated from Doppler shift in the GPS carrier signal which gives un-paralleled accuracy.

IMU Integration

VBOX3i can take the output from a Racelogic IMU and use this to improve all of the parameters measured in real time. This is especially useful in poor satellite conditions such as near trees, buildings or bridges. All data is processed at 100Hz, and not only are the accuracy and noise levels improved, but the dynamic response of the velocity is also enhanced. Parameters which are smoothed by this process include velocity, position, height, lateral and longitudinal acceleration and vertical velocity. Complete satellite dropouts such as going under a bridge are dealt with very effectively using this method, up to a maximum time period of 10s without any lock.

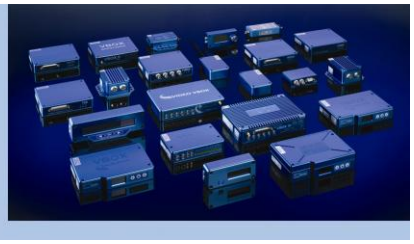
Analogue Inputs

The four analogue input channels on VBOX 3i each have a dedicated 24bit analogue converter. Data is recorded from each channel simultaneously to avoid any latency between analogue channel data. The name, scale and offset of each analogue input channel can be adjusted using VBOX Tools software to allow sensor calibration and therefore logging of data in standard SI units. The analogue input connector also provides two power outputs that may be used for driving sensors. These are in the form of a 5v DC isolated supply and an output equal to the VBOX power supply voltage.



Analogue Outputs

The 2 x 16bit analogue outputs can be configured by the user to output velocity or other GPS parameters for use by other data logging equipment. The voltage output range is from 0 to 5v DC with a resolution of 76 µV per bit.



Digital Outputs

Two digital outputs are available on VBOX 3i. The first input is used for brake trigger or event sensing and is capable of measuring the brake trigger to an accuracy of 10ns. The second digital input is used for remote logging control using a hand-held switch.

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CAN Bus

Two CAN Bus interfaces are available on VBOX 3i. The use of separate CAN bus connections allows data to be logged from Racelogic external modules, for example TC8 or FIM02, while transmitting VBOX GPS CAN data on the second bus. It is also possible to log 8 CAN signals from another CAN source such as a vehicle CAN bus. When logging data from another source, VBOX Tools can load signal data from an industry standard CAN database file (.DBC).

RS232 Serial

The RS232 connector is used for VBOX configuration and output of real-time GPS data. The serial data sent in real time to the software is limited by the bandwidth of the PC serial port to 20Hz. (Full 100hz serial available via USB / Bluetooth.)

Bluetooth

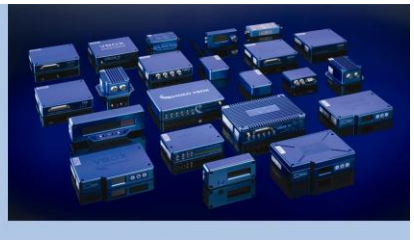
VBOX 3i comes equipped with an internal Bluetooth Radio allowing remote configuration and remote output of real-time GPS data to any Bluetooth capable PC or Datalogger. The Bluetooth connection is capable of sending data at the full 100Hz rate.

USB

VBOX 3i USB connector can be used for VBOX configuration and output of real-time GPS data at the full 100Hz data rate.

Audio

VBOX 3i has the capability of recording a GPS synchronised WAV audio tag up to 30 seconds long to a time accuracy of 0.5 sec. The recorded WAV file is then logged to the CF card.



Compact Flash

VBOX 3i can accept Type I compact flash cards for logging of data. Data is stored in a standard PC format allowing fast transfer of data to a PC equipped with a compact flash card reader. The file format is an ASCII text file that can be loaded directly into VBOX Tools software, or imported into Excel and other third party software.

Power Supply

VBOX 3i can accept a supply voltage in the range of 7 to 30V DC. Low current consumption results in extended battery life.

Differential GPS

VBOX 3i can work in SBAS or RTCM DGPS modes (all accuracies listed in 95% CEP, see next page):

SBAS DGPS offers ±1m accuracy and requires no additional equipment

RTCM DGPS offers ±40cm accuracy (requires Basestation RLVBBS2)

RTK DGPS offers ±2 cm accuracy (requires RTK option and RLVBBS3G)

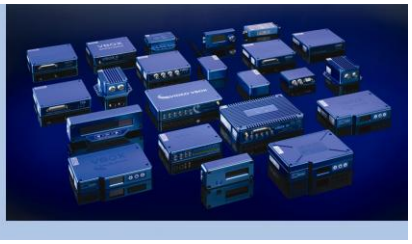
Hardware / Software Support

One Year Hardware/Lifetime Software Support Contract.

Lifetime Software Support Contract is 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.

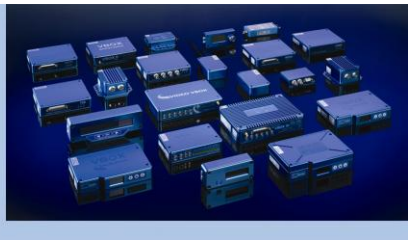
Package Contents

RLVB3i	1 x 100Hz GPS datalogger	RLVBCAB01	5-way LEMO to 9-way D-type serial cable -2m
RLVBACS020	1 x Mains Charger	ADC25IPCON	25-way D-type connector
RLVBCAB10	12VDC cigar lighter – 2-way LEMO power lead – 1m	RLVBACS013	VBOX Padded carry case
	2 x spare fuse 3.15A 250V	RLCAB066	USB A – Mini B Lead
		RLCACS120	VBOX Audio Headset
RLVBACS067	Antenna	RLVB3iMAN	VBOX User manual
RLVBACS001	1 x GPS antenna (plus 1 spare)	VBTOOLSMANA4	VBOX Tools Manual
RLACS107	2 Gb Compact Flash card	RLVBACS030	VBOX Tools Software CD
RLVBACS028	PCMCIA Compact Flash adaptor	RLACS119	Bluetooth Antenna



GPS Specifications

Velocity		**Distance**	
Accuracy	0.1 Km/h (averaged over 4 samples)	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		
Absolute Positioning		**Time**	
Accuracy	3m 95% CEP**	Resolution	0.01 s
Accuracy with SBAS DGPS	>1m 95% CEP**	Accuracy	0.01 s
Accuracy with RTCM DGPS	40cm 95% CEP**		
Accuracy with RTK DGPS	2cm 95% CEP** (optional)	**Brake stop Accuracy**	
Update rate	100 Hz	Accuracy	+/- 2cm
Resolution	1.8 mm		
Heading		**Power**	
Resolution	0.01°	Input Voltage range	7 – 30V DC
Accuracy	0.1°	Power	Max 5.5 watts
Acceleration		**Environmental and physical**	
Accuracy	0.50%	Weight	Approx 900 Grams
Maximum	20 G	Size	170mm x 121mm x 41mm
Resolution	0.01 G	Operating temperature	-20°C to +70°C
Update rate	100Hz	Storage temperature	-30°C to +80°C
Memory		**Definitions**	
Compact Flash	Type I	** CEP = Circle of Error Probable 95% CEP (Circle Error Probable) means 95% of the time the position readings will fall within a circle of the stated diameter	
Recording time	Dependent on flash card capacity*		
* Approximately 29Mb per hour used when logging GPS data at 100Hz; Approx 182Mb per hour total logging capacity		2cm accuracy requires an RTK option and RTK enabled Basestation	



Outputs

CAN Bus

Bit rate	125Kbits, 250Kbits ,500Kbits & 1Mbit selectable baud rate
Identifier type	Standard 11bit 2.0A
Data available	Satellites in View, Latitude, Longitude, Velocity, Heading, Altitude, Vertical Velocity, Distance, Longitudinal Acceleration & Lateral Acceleration, Distance from Trigger, Trigger Time, Trigger Velocity

Analogue		**Digital**	
Voltage range	0 to 5Volts DC	Frequency range	DC to 44.4Khz
Default setting *	Velocity 0.0125Volts per Km/h (0 to 400Km/h)	Default setting *	25Hz per Km/h (0 to 400Km/h)
Accuracy	0.1 Km/h		90 pulses per metre
Update rate	100Hz	Accuracy	0.1Km/h
		Update rate	100Hz

** The range settings can be adjusted by the user in VBOX Tools Software*

Inputs

CAN Bus

Racelogic modules	Up to 32 channels from any combination of ADC02, ADC03, FIM02, TC8, Yaw sensor or CAN01
External CAN Bus	16 Channels of user definable CAN signal from external bus. Eg; vehicle CAN bus Can load signal data from industry standard DBC database file.

Analogue

Number Channels	4	Resolution	24 bit
Input range	±50v	DC Accuracy	400 µV
Channel Sample order	Synchronous		

Digital

Brake/Event Trigger	10ns resolution
On/Off Logging control	Remote log control from hand-held switch