C-Nav®

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Vector™ VS1000 GNSS Receiver

High-Precision Positioning and Heading Receiver

Oceaneering is an authorized reseller of the Vector VS1000, Hemisphere® GNSS' premiere multi-GNSS, multi-frequency receiver designed specifically for the professional marine market. Providing precise heading, Athena RTK positioning, and full Atlas capability, its rugged design is compliant to IP67, MILSTD-810G, MIL-STD-202F, and IEC 60068-2 standards.

The VS1000 supports antenna separations up to 10 meters, offering heading accuracy to 0.01° RMS in addition to RTK position accuracy and full support for Hemisphere GNSS' Atlas worldwide L-band corrections.

Vector™ VS1000 GNSS Receiver

Key Features

- Athena™ RTK and Atlas® L-band capable
- Extremely accurate heading (to 0.01° RMS)
- Multi-frequency GPS/GLONASS/BeiDou/Galileo/QZSS/IRNSS
- Purpose-built for the most challenging environments
- Supports Ethernet, CAN, Serial, USB, Bluetooth, and Wi-Fi
- Powerful WebUI accessed via Wi-Fi, plus a 128 x 64 display and 10 multi-color LEDs

GNSS Receiver Specifications	
Receiver Type	Vector GNSS RTK Receiver
Signals Received	GPS, GLONASS, BeiDou, Galileo, QZSS [7], 7IRNSS, and Atlas [3]
Channels	1059
GPS Sensitivity	-142 dBm
SBAS Tracking	2-channel, parallel tracking
Update Rate	10 Hz standard, 20 Hz optional

Timing (1 PPS)	
Accuracy	20 ns
Rate of Turn	100°/s maximum
Cold Start	60 s (no almanac or RTC)
Warm Start	30 s typical (almanac and RTC)
Hot Start	10 s typical (almanac, RTC, and position)
Heading Fix	10 s typical (valid position)

Antenna Input	
Impedance	50 Ω
Maximum Speed	1,850 mph / 999 kts
Maximum Altitude	60,000 ft / 18 288 m
Differential Options	SBAS, Atlas (L-band), RTK

Accuracy		
Position	RMS (67%)	2DRMS (95%)
Single Point [1]	7.9 ft / 2.4 m	-
SBAS [2]	2 ft / 0.6 m	-
Atlas H10 [6]	0.27 ft / 0.08 m	0.16 m
Atlas H30 [6]	0.99 ft / 0.3 m	-
Atlas Basic [6]	1.6 ft / 0.5 m	-
RTK [1, 3]	0.3 in / 8 mm + 1 ppm	0.6 in / 15 mm + 2 ppm
Heading (RMS)	0.2° @ 1.6 ft / 0.5 m antenna separation 0.1° @ 3.3 ft / 1.0 m antenna separation 0.05° @ 6.6 ft / 2.0 m antenna separation 0.02° @ 16.4 ft / 5.0 m antenna separation 0.01° @ 32.8 ft / 10.0 m antenna separation	
Pitch/Roll (RMS)	1°	
Heave (RMS)	11.8 in / 30 cm (DGPS) [1], 3.9 in / 10 cm (Atlas) [1, 6], 2 in / 5 cm (RTK) [1, 6]	

L-Band Receiver Specifications	
Channels	1,525 to 1,560 MHz
Sensitivity	-130 dBm
Channel Spacing	5 kHz
Satellite Selection	Manual or Automatic
Reacquisition Time	15 s (typical)

Communications	
Ports	1x CAN, 1x Ethernet, 1x USB, 1x 12-pin multi-purpose (RS232, RS422, CAN, 1 PPS, Event Marker)
Baud Rates	4800–115200
Radio Interfaces	Bluetooth 2.0 (Class 2), Wi-Fi 2.4 GHz
Correction I/O Protocol	Hemisphere GNSS proprietary ROX format, RTCM v2.3, RTCM v3.2, CMR [8], CMR+ [8]
Data I/O Protocol	NMEA 0183, Hemisphere GNSS binary
Timing Output	1 PPS (CMOS, rising edge sync)
Event Marker Input	Open drain, falling edge sync, 10 kΩ, 10 pF load

Environmental	
Operating Temperature	-40°F to 158°F / -40°C to 70°C
Storage Temperature	-40°F to 185°F / -40°C to 85°C
Humidity	95% non-condensing
Enclosure	ISO 60529:2013 for IPX6/IPX7
Vibration	IEC 60945:2002 Section 8.7 Vibration
EMC	IEC 60945:2002 EN 301 489-1 V2.1.1 EN 301 489-5 V2.1.1 EN 301 489-19 V2.1.0 EN 303 413 V1.1.1

Mechanical	
Dimensions (LxWxH)	
No Plate	9.1 in x 6.5 in x 3.1 in 23.2 cm x 16.5 cm x 7.9 cm
With Plate	9.1 in x 8.4 in x 3.3 in 23.2 cm x 21.4 cm x 8.3 cm
Display	128 x 64 Resolution
Weight	3.8 lb / 1.7 kg
Status Indications (LED)	Power, Primary Antenna, Secondary Antenna, Heading, Quality, Atlas, Bluetooth, Wi-Fi, CAN, Ethernet
Power/Data Connector	M12 CAN/Power, 12-pin multi-purpose
Antenna Connectors	BT/Wi-Fi

Aiding Devices	
Gyro	Provides fast reacquisition and reliable heading for short periods when loss of GNSS has occurred
Tilt Sensors	Provide pitch, roll data, and assist in fast start-up and reacquisition of heading solution

1. Depends on multipath environment, number of satellites in view, satellite geometry, no SA, and ionospheric activity
2. Depends on multipath environment, number of satellites in view, WAAS coverage, and satellite geometry
3. Depends on multipath environment, number of satellites in view, satellite geometry, baseline length (for differential services), and ionospheric activity
4. Based on a 40 s time constant
5. Hemisphere GNSS proprietary
6. Requires a Hemisphere GNSS subscription
7. With future firmware upgrade and activation
8. CMR and CMR+ do not cover proprietary messages outside of the typical standard

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