Hemisphere

Vector™ VR1000 GNSS Receiver

GNSS RECEIVER FOR MACHINE CONTROL SYSTEMS

atlas

The Vector VR1000 is Hemisphere GNSS' premiere multi-GNSS, multi-frequency position and heading receiver designed specifically for the machine control market. Providing precise heading, Athena RTK positioning, and full Atlas capability, its rugged design is compliant to IP69K, MIL-STD-810G, and IEC 60068-2 standards.

The VR1000 supports antenna separations up to 10 meters, offering heading accuracy to 0.01 degrees RMS in addition to RTK position accuracy and full support for Hemisphere GNSS' Atlas Global Correction Service.

Key Features

- Athena™ RTK Engine
- Extremely accurate heading with baselines up to 10m
- Multi-frequency GPS/GLONASS/BeiDou/Galileo/QZSS/IRNSS
- Atlas® Global Correction Service
- Integrated Ethernet, CAN, internal 400MHz radio, Serial, Bluetooth, and Wi-Fi
- Powerful WebUI accessed via Wi-Fi plus 12 multi-color LEDs
- Integrated IMU delivers fast start-up times and maintains heading during temporary GNSS outage
- Fully rugged IP69K, and MIL-STD-810G compliant solution for the harshest environments

GNSS Receiver Specifications

Receiver Type:	GNSS Position & Heading RTK Receiver
Signals Received:	GPS, GLONASS, BeiDou, Galileo, QZSS, IRNSS, and Atlas
Channels:	1059
GPS Sensitivity:	-142 dBm
SBAS Tracking:	3-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:	40 s (no almanac or RTC)
Warm Start:	20 s typical (almanac and RTC)
Hot Start:	5 s typical (almanac, RTC and position)
Heading Fix:	10 s typical (Hot Start)
Antenna Input Impedance:	50 Ω
Maximum Speed:	1,850 kph (999 kts)
Maximum Altitude:	18,000 m (59,055 ft)
Differential Options:	SBAS, Atlas (L-band), RTK

Accuracy

Positioning:	**RMS (67%)**	**2DRMS (95%)**
Autonomous, no SA: [2]	1.2 m	2.5 m
SBAS: [2]	0.25 m	0.5 m
Atlas: [2,3]	0.04 m	0.08 m
RTK: [1]	10 mm + 1 ppm	20 mm + 2 ppm
Heading (RMS):	< 0.2° @ 0.5 m antenna separation	
	< 0.1° @ 1.0 m antenna separation	
	< 0.05° @ 2.0 m antenna separation	
	< 0.02° @ 5.0 m antenna separation	
	< 0.01° @ 10.0 m antenna separation	
Pitch/Roll (RMS):	1°	
Heave (RMS):	30 cm (DGPS) [3],10 cm (RTK) [3]	

L-Band Receiver Specifications

Receiver Type:	Single Channel
Channels:	1530 to 1560 MHz
Sensitivity:	-130 dBm
Channel Spacing:	5 kHz
Satellite Selection:	Manual or Automatic
Reacquisition Time:	15 sec (typical)

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. Requires a subscription
4. Depends on multipath environment, number of satellites in view, satellite geometry, baseline length (for differential services), and ionospheric activity
5. Hemisphere GNSS proprietary
6. CMR and CMR+ do not cover proprietary messages outside of the typical standard

Communications

Ports:	1x full-duplex RS-232/RS-422, 1x full-duplex RS232, 2x CAN, 1x Ethernet
Baud Rates:	4800 - 115200
Radio Interfaces:	Bluetooth 2.0 (Class 2), Wi-Fi 2.4 GHz, UHF (400 MHz)
Correction I/O Protocol:	Hemisphere GNSS proprietary ROX format, RTCM v2.3, RTCM v3.2, CMR[6], CMR+[6]
Data I/O Protocol:	NMEA 0183, Hemisphere GNSS binary
Timing Output:	1 PPS, CMOS, active high, rising edge sync, 10 kΩ, 10 pF load
Event Marker Input:	CMOS, active low, falling edge sync, 10 kΩ, 10 pF load

Power

Input Voltage:	9-36 VDC
Power Consumption:	10.8W Maximum (All signals and L-band)
Current Consumption:	1.2A Maximum
Power Isolation:	No
Reverse Polarity Protection:	Yes

Environmental

Operating Temperature:	-40°C to +70°C (-40°F to +158°F)
Storage Temperature:	-40°C to +85°C (-40°F to +185°F)
Humidity:	95% non-condensing
Mechanical Shock:	50G, 11ms half sine pulse (MIL-STD-810G w/ Change 1 Method 516.7 Procedure 1)
Vibration:	7.7Grms (MIL-STD-810G w/Change 1 Method 514.7 Category 24)
EMC:	CE (ISO14982/EN13309/ISO13766/ IEC60945), Radio Equipment Directive 2014/53/EU, E-Mark, RCM
Enclosure:	IP69K

Mechanical

Dimensions:	
No Plate:	23.2 L x 16.5 W x 7.9 H (cm) 9.1 L x 6.5 W x 3.1 H (in)
With Plate:	23.2 L x 21.4 W x 8.3 H (cm) 9.1 L x 8.4 W x 3.3 H (in)
Status Indications (LED):	Power, Primary Antenna, Secondary Antenna, Heading, Quality, Atlas, Bluetooth, Wi-Fi, CAN1, CAN2, Ethernet, Radio
Power/Data Connector:	23-pin multi-purpose

Aiding Devices

Gyro:	Provides smooth heading, fast heading reacquisition and reliable < 0.5° per min heading for periods up to 3 min. when loss of GNSS has occurred [4]
Tilt Sensors:	Provide pitch/roll data and assist in fast start-up and reacquisition of heading solution

Hemisphere®

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