

### KEY FEATURES

Scalable product line - upgrade when it suits you

Simple connections, keypad and display delivers rapid system integration

Multiple correction sources - reduce down time with backup options

Built-in display and keyboard – no extra controller needed

Optional RS upgrade – Can be used as a DGPS reference station



### FLEXIBLE, MODULAR ROVER RECEIVER AND DGPS BASE STATION

The Trimble® DSM™ 232 DGPS receiver is an ideal solution for dynamic real-time marine positioning operations such as harbor dredging and for commercial positioning applications where it is integrated as the positioning sensor component. The modular GPS receiver with antenna options accepts GPS corrections from a variety of sources allowing the user the choice of sub-meter to centimeter performance.

The DSM 232 receiver is a high-quality solution for applications that require sub-meter, decimeter or centimeter positioning in demanding environments.

The DSM 232 receiver offers a wide range of GPS positioning methods and associated accuracies for offshore and onshore marine construction applications:

- Satellite Based Augmentation Systems (SBAS) such as WAAS, EGNOS and MSAS
- IALA compliant Navigation Beacon
- OmniSTAR VBS service<sup>1</sup>
- RTCM from a site based DGPS Reference Station
- OmniSTAR XP/HP<sup>1</sup>
- Real Time Kinematic (RTK) for maximum precision

This breakthrough GPS technology gives the operator the flexibility to purchase an upgradeable or non-upgradeable receiver. The non-upgradeable receiver can be purchased to accommodate current strict budget needs, or in cases of a more flexible budget, purchase the upgradeable receiver in anticipation of growth in the company's future projects.

The entry level DSM 232 includes a combined GPS / Beacon antenna capable of sub-meter performance using the free public IALA Beacon and SBAS corrections or subscription-based OmniSTAR VBS corrections. The beacon receiver provides superior weak-signal performance, allowing differential corrections to be received at long distances from the reference station and during challenging weather conditions.

With the addition of a dual frequency antenna and firmware upgrade the upgradeable DSM 232 models can use the OmniSTAR XP/HP satellite correction services. In this mode, performance is enhanced to decimeter accuracy

in vertical and horizontal position over a large geographic (land based) region. With OmniSTAR XP service, there is no degradation in position accuracy as generally associated with increasing distance from a fixed reference station.

The DSM 232 can be ordered with additional firmware to add premium RTK performance for high precision construction tasks. The DSM 232 can be used in an RTK rover mode through the use of an external radio link. Again, the upgradeable DSM 232 model can also be upgraded to include this RTK functionality.

The modularity of the DSM 232 system delivers installation flexibility via external GPS antenna options, as required on marine vessel installations, such as on top of a mast. The receiver can be mounted in a secure environment protected from the weather and theft, leaving only the antenna outside. In all cases the receivers EVEREST™ technology improves results in high multi-path environments such as those encountered on inland waterways and harbor construction sites.

### SUPERIOR INTEGRATION

The DSM 232 receiver is designed for easy integration into onboard systems. The built-in display and keyboard offers fast configuration and status information. The position, velocity, correction status and time is available from the data ports in NMEA 0183 or NMEA 2000®. The DSM 232 receiver outputs position reports data at rates up to 10 Hz. The 3 serial ports can also be used for setup, control, and data output using Trimble Standard Interface Protocol (TSIP) providing compatibility with previous DSM receiver model installations.

### DGPS REFERENCE STATION

In regions where the free-to-air correction services such as IALA Beacon or SBAS services are not available, the DSM 232 RS DGPS Reference Station can be used. In this case an external radio can be used to deliver the high quality RTCM SC-104 format corrections to rover units.

<sup>1</sup> OmniSTAR VBS/XP/HP services require a subscription from the service provider so check with them for availability and operating constraints in your area.

# TRIMBLE DSM 232 MODULAR GPS RECEIVER

## STANDARD SYSTEM FEATURES

- Modular receiver (separate antenna and receiver unit) for installation flexibility and security of investment
- Integrated display and keypad for system configuration and status checking without external software
- External GPS antenna choices for single frequency, dual frequency or DGPS base station operation
- IALA Beacon, Satellite Based Augmentation Systems (SBAS) such as WAAS, EGNOS compatible
- Accepts RTCM and CMR (optional) corrections from external radio link
- Upgradable to and available as 24-channel L1/L2 GPS receiver for improved accuracy performance, allowing for:
  - 3D decimeter accuracy OmniSTAR XP and HP service capable
  - 3D centimeter accuracy RTK capable
- Up to 10 Hz measurement update rate (NMEA and TSIP Protocols)
- Two physical connectors allow for 3 programmable RS-232 serial ports and 2 NMEA 2000® capable ports
- 1PPS signal
- Waterproof and dustproof
- -30 °C to +70 °C (-22 °F to +158 °F) operating temperature range
- 9V to 32V DC input power range with over-voltage protection
- Backward compatibility with DSM132 – same antenna cable, single frequency / beacon antenna, power and data cable, and mounting bolt pattern
- Suitable for permanent / semi-permanent as well as short term installations

## HARDWARE SPECIFICATIONS

### Physical

Size (WxHxD) . . . . . 14.8 cm (5.7 in) x 5.6 cm (2.2 in) x 21.6 cm (8.6 in)  
Receiver Weight . . . . . 0.96 kg (2.13 lb)  
Keyboard and display . . . LCD backlight display 16 characters by 2 rows,  
4 button keypad

Antenna Mounting . . . . . All accept 5/8" UNC male bolt

### Environmental

Operating temperature . . . . . -30 °C to +70 °C (-22 °F to +158 °F)  
Storage temperature . . . . . -34 °C to +85 °C (-29 °F to +185 °F)  
Humidity . . . . . Complies with MIL 810E. Unit sealed to +/- 5 PSID  
Water . . . . . Waterproof and dustproof

### Electrical

Power . . . . . 9 V to 32 V DC external power input  
with over-voltage protection  
Power consumption . . . . . Nominal 350 mA at 12 V DC  
Certification . . . . . Class B Part 15, 22, 24 FCC certification,  
CE mark approval, C-tick approval, WEEE

### Communications

- Two CONXALL connectors on the back plane, Port A and B
- 3 programmable RS232 outputs
- 2 CAN (NMEA 2000®) outputs

Receiver position update rate . . . . . 1,2,5,10 Hz  
Correction Data Input . . . CMR II, CMR+, RTCM 2.1, RTCM 2.3, RTCM 3.0  
Correction Data Output (with RS option installed) . . . . . RTCM 2.1,  
RTCM 2.3, RTCM 3.0  
RS232 Outputs . . . . . NMEA – GGA, GLL, GRS, GSA, GST, GSV, MSS, RMC,  
VTG, ZDA, various Proprietary NMEA TSIP format  
CAN Outputs . . . . . J1939, NMEA 2000®

© 2005–2006, Trimble Navigation Limited. All rights reserved. Trimble and the Globe & Triangle logo are trademarks of Trimble Navigation Limited, registered in the United States Patent and Trademark Office and in other countries. DSM and EVEREST are trademarks of Trimble Navigation Limited. All other trademarks are the property of their respective owners. PN 022482-312A (09/06)

## ANTENNA SPECIFICATIONS

### DGPS Antenna

Size . . . . . 15.5 cm (6.1 in) D x 14.0 cm (5.5 in) H  
Weight . . . . . 0.55 Kg (1.2 lb)  
Operating Temperature . . . . . -30 °C to +70 °C  
Usage . . . . . L1 GPS, Beacon, SBAS and L-Band

### Dual Frequency Antenna

Size . . . . . 16 cm (6.25 in) D x 7.5 cm (3 in) H  
Weight . . . . . 0.55 Kg (1.2 lb)  
Operating Temperature . . . . . -30 °C to +70 °C  
Usage . . . . . L1/L2 GPS, SBAS and L-Band

### Geodetic Reference Station Antenna

Size . . . . . 34.3 cm (13.5 in) D x 7.6 cm (3 in) H  
Weight . . . . . 1.31 Kg (2.88 lb)  
Operating Temperature . . . . . -40 °C to +70 °C  
Usage . . . . . L1/L2 GPS and SBAS

Humidity/Case. . . All antennae are 100% condensing, units fully sealed.  
Dust-proof, waterproof, shock resistant

## OPTIONS

- Upgrade DGPS receiver to OmniSTAR XP/HP (includes dual frequency antenna)
- Upgrade OmniSTAR XP/HP receiver to RTK rover
- Upgrade for DGPS Reference Station

## PERFORMANCE SPECIFICATIONS

### Measurements

- Trimble EVEREST multi-path mitigation technology
- DGPS: 12 Channel L1 plus 2 channels for Beacon
- DGPS with SBAS (WAAS / EGNOS / MSAS): 11 GPS channels plus 1 for SBAS
- RTK or OmniSTAR VBS/XP/HP: 24 channel L1/L2 plus 1 channel L Band

### Code differential GPS positioning

Horizontal accuracy . . . . . ±(0.25 m + 1 ppm) RMS ±(0.8 ft + 1 ppm)  
Vertical accuracy . . . . . ±(0.50 m + 1 ppm) RMS ±(1.6 ft + 1 ppm)

### WAAS / EGNOS / MSAS<sup>1</sup>

Horizontal accuracy . . . . . Typically 1 m (3 ft)  
Vertical accuracy . . . . . Typically <5 m (<16 ft)

### OmniSTAR Positioning

VBS Service Accuracy . . . . . Horizontal typically better than 1 m (3 ft)  
XP Service Accuracy . . . . . Horizontal 20 cm (.7 ft), Vertical 30 cm (1 ft)  
HP Service Accuracy . . . . . Horizontal 10 cm (.3 ft), Vertical 20 cm (.7 ft)  
OmniSTAR XP/HP Convergence . . . Cold start - Typically 10 to 40 minutes  
depending on satellite geometry

### Real Time Kinematic (RTK) positioning<sup>2</sup>

Horizontal accuracy . . . . . ±(10 mm + 1 ppm), ±(.03 ft + 1 ppm)  
Vertical accuracy . . . . . ±(20 mm + 1 ppm), ±(.07 ft + 1 ppm)

### Initialization time

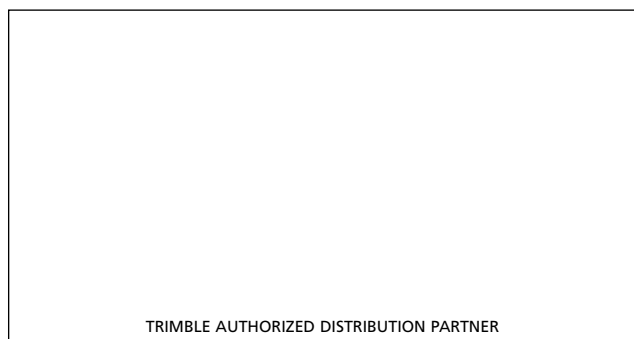
Regular RTK operation with base station . . Single/Multi-base minimum  
10 sec + 0.5 times baseline  
length in km, <30 km  
Initialization reliability<sup>3</sup> . . . . . Typically >99.9%

<sup>1</sup> Depends on WAAS / EGNOS / MSAS system performance

<sup>2</sup> Accuracy and reliability may be subject to anomalies such as multipath, obstructions, satellite geometry and atmospheric conditions. Always follow recommended practices.

<sup>3</sup> May be affected by atmospheric conditions, signal multipath and satellite geometry. Initialization reliability is continuously monitored to ensure highest quality.

Specifications subject to change without notice.



TRIMBLE AUTHORIZED DISTRIBUTION PARTNER

## NORTH AMERICA

Trimble Construction Division  
5475 Kellenburger Road  
Dayton, Ohio 45424  
USA  
800-538-7800 (Toll Free)  
+1-937-245-5154 Phone  
+1-937-233-9441 Fax

## EUROPE

Trimble GmbH  
Am Prime Parc 11  
65479 Raunheim  
GERMANY  
+49-6142-2100-0 Phone  
+49-6142-2100-550 Fax

## ASIA-PACIFIC

Trimble Navigation  
Singapore PTE Ltd.  
80 Marine Parade Road, #22-06  
Parkway Parade  
Singapore, 449269  
SINGAPORE  
+65 6348 2212 Phone  
+65 6348 2232 Fax



www.trimble.com