TRIMBLE MARINE INERTIAL POSITIONING SYSTEM

The Trimble® Marine Inertial Positioning System delivers precise 3D position, attitude, and GNSS aided azimuth. It includes a dual antenna GNSS system, a calibrated electromechanical IMU sensor (MEMS) integrated with an Inertial Navigation System (INS) that uses the Applanix® engine.

APPLICATIONS

Suitable for marine contractors who are constructing ports, seawalls or waterways with large dredging, placement or piling machines the system provides reliable position and orientation data. In port and waterway construction, the Trimble Marine Inertial Positioning System ensures precise data can be integrated with sonar data to give accurate depths. This helps where the operator needs precise underwater mapping before they move the machine away. Or where the operator has a survey vessel to undertake the progress and 'as built' tasks.

For floating plant, the system provides real-time position and orientation for research, construction or safety reasons. Marine operations can make use of the heave data to compensate for the effect of swell on vertical positioning accuracy.

ACCURACY & CORRECTIONS

The system comes with the capability to track all the constellations - GPS, GLONASS, BeiDou, QZSS, and Galileo. It can obtain corrections from:

▶ A GNSS base station, Internet Base Station System (IBSS) or VRS™ system to deliver precise RTK positions

▶ A subscription to MarineSTAR for base station free corrections

▶ SBAS corrections (EGNOS, WAAS, GAGAN, MSAS)

COMPONENTS

▶ MPS500 - sensor unit with all constellations tracked and precise RTK rover functionality installed

▶ Two Trimble GA830 GNSS antennas suitable for marine applications

▶ Two 10m antenna cables

▶ USB Stick with PC utilities and the User Guide with an installation and calibration checklist

▶ All items supplied in a rugged carry case

▶ Set of rugged cables for the MPS500 sensor:
  – Power cable
  – Shielded Ethernet cable
  – I/O RS232 and RS422 data cables including 1PPS
  – RS232 extension cable

Benefits

▶ Tightly coupled Trimble dual antenna GNSS receiver with IMU sensor in one housing provides a robust positioning solution with less cabling.

▶ Delivers position and attitude even when used in compromising marine situations such as a congested port.

▶ Higher performance than a dual GNSS antenna receiver cabled to a third party IMU (Pitch Roll Heave) sensor

▶ Deliver dead reckoning data during limited satellite coverage to maintain productivity

▶ Suitable for new or retrofit installations

▶ Provides legacy NMEA-type messages as real-time data outputs including heave, for existing marine software to use.

Trimble

Trimble Marine Inertial Positioning System

MPS500 MARINE POSITIONING SENSOR SPECIFICATIONS

CONFIGURATION OPTIONS
Rover position and attitude update rate........ Up to 50 Hz (up to 200 Hz with Applanix Ethernet data option)
Rover operation within a VRS™ network .... Yes
Available Options .... MarineSTAR satellite corrections.
Applanix proprietary Ethernet output data also allows TrueHeave, Data logging.

ANTENNA OPTIONS
GA830................................... GNSS (GPS, QZSS, Glonass, Galileo, BeiDou), MSS (MarineSTAR), L1 SBAS.
For more details refer to the GA830 Spec Sheet

ENVIRONMENT
Operating temperature........................... −20 °C to +60 °C (−4 °F to +140 °F)
Storage temperature............................ −40 °C to +70 °C (−40 °F to +158 °F)
Humidity .... 5~95% RH, non condensing
Waterproof IP66

SHOCK AND VIBRATION
Shock................. RTCA/DO-160F section 7, Cat B operation shock and acceleration
Shock.. Non-operating to ± 20 G
Shock...Operating to ± 6 G
Vibration ....RTCA/DO-160F section 8, CatU2 Zone2, Curves F and F1, Random 3.3 G RMS performance, Random 4.7 G RMS endurance

MEASUREMENTS
- Advanced Trimble Maxwell™ 6 Custom GPS Chips
- High-precision multiple correlator for GNSS pseudorange measurements
- Unfiltered, unsmoothed pseudo-range measurements data for low noise, low multipath error, low-time domain correlation, and high-dynamic response
- Very low noise carrier phase measurements with <1 mm precision in a 1 Hz bandwidth
- Trimble EVEREST™ multipath signal rejection
- MSS Band: MarineSTAR by subscription
- GPS L1 C/A, L2C, L2E (Trimble method for tracking unencrypted L2P). 220 channels
- GLONASS L1/L2C/A, L2P Full Cycle Carrier
- Galileo: L1 CBOC, E5A, E5B & E5AltBOC[3]
- BeiDou: B1, B2
- QZSS: L1 C/A, L1C, L1 SAIF, L2C, L5
- 4-channel SBAS L1 C/A, L5 (WAAS/EGNOS/MSAS/GAGAN)

SBAS (WAAS/EGNOS/MSAS/GAGAN) POSITIONING[2]
Accuracy...........................Horizontal ± 0.50m (1.6 ft), Vertical ± 0.85m (2.8 ft)

CODE DIFFERENTIAL GPS POSITIONING[1]
Horizontal accuracy......................... 0.50 m + 1 ppm RMS (1.6 ft + 1 ppm RMS)
Vertical accuracy .... 0.50m + 1 ppm RMS (1.6 ft + 1 ppm RMS)

OMNISTAR POSITIONING
MarineSTAR service accuracy .... Horizontal 0.1 m (0.3 ft), Vertical 0.15 m (0.5 ft)

REAL-TIME KINEMATIC (RTK UP TO 30 KM)

POSITIONING[1]
Horizontal accuracy........................ 8 mm + 1 ppm RMS (0.026 ft + 1 ppm RMS)
Vertical accuracy .... 15 mm + 1 ppm RMS (0.05 ft +1 ppm RMS)

TRIMBLE VRS[4]
Horizontal accuracy........................ 8 mm + 0.5 ppm RMS (0.026 ft +0.5 ppm)
Vertical accuracy .... 15 mm + 0.5 ppm RMS (0.05 ft +0.5 ppm)

POSITION ACCURACY DURING GNSS OUTAGE
Horizontal accuracy....0.6m (2 ft) for 10 secs, 2.5m (8 ft) for 20 secs total outage (RTK)

PRECISE HEADING
Heading accuracy
2 m antenna separation .... 0.08°
4 m antenna separation .... 0.06°
Heading accuracy during GNSS outage .... 0.3° after 60 second outage

HEAVE
Accuracy... 5cm (0.16 ft) or 5%
TrueHeave (Optional upgrade) .... 2cm (0.07 ft) or 2%

ROLL AND PITCH
Accuracy........................... 0.03° with RTK or MarineSTAR. 0.04° with DGPS
During GNSS Outage.. 0.05°
Post Processed (Option) .... <0.03°

REGULATORY COMPLIANCE
FCC Part 15 Subpart B (Class B Device), Canadian ICES-003
VCCI V-3/2015.04, AS/NZC CISPR 22, EN55022, EN55024, EN60950-1
CE mark compliant, RoHS Compliant, WEEE Compliant

GENERAL SPECIFICATIONS
Status Lights .... 3 - Power, Status, Logging
Dimensions (L × W × D) .... 145mmL x 160mmW x 66mmH for MPS500 Sensor only
Weight .... 1.3 kg (2.9 lb) for MPS500 Sensor only

COMMUNICATIONS
Serial .... 5 Ports. NMEA or Binary output to 50Hz. GNSS corrections input
1PPS (1 Pulse-per-second)... Dedicated BNC
Standard Ethernet .... NMEA and Auxilliary data.
Also used with POSview controller software
Optional Output ....TrueHeave, Data Logging, Proprietary position, attitude, raw IMU, raw GNSS. Up to 200 Hz output
External GSM/GPRS .... External SNM940. GNSS Radio on external Computer with corrections sent to MPS500
Receiver position update rate .... Up to 50 Hz positioning. 200Hz with Applanix Ethernet option
Correction data input .... CMR™, CMR+™, RTCM 2.x, RTCM 3.x
Data outputs .... NMEA, 1PPS, Standard marine messages TSS1, $PASHR, SIMRAD1000 etc

POWER
External DC .... 9-34 VDC
Current .... 2.5 A Maximum

1 Accuracy and reliability may be subject to anomalies such as multipath, obstructions, satellite geometry, interference and atmospheric conditions. Always follow recommended survey practices.
2 Depends on SBAS system performance.
3 Galileo Commercial Authorization. Developed under a Licence of the European Union and the European Space Agency."
4 Networked RTK PPM values are referenced to the closest physical base station