

NMEA 0183 and other messages

Message	Info Type	Description	IEC Approved Message
\$GPD TM	P	Datum reference	Yes
\$GPGGA	P	GPS position and fix data	Yes
\$GPGLL	P	Geographic position - lat/long	Yes
\$GPGNS	P	GNSS position and fix data	Yes
\$GPGRS	S	GNSS range residual (RAIM)	Yes
\$GPGSA	S	GNSS DOP and active satellites	Yes
\$GPGST	S	GNSS pseudo range error statistics and position accuracy	Yes
\$GPGSV	S	GNSS satellites in view	Yes
\$GPHDG	H	Provides magnetic deviation and variation for calculating magnetic or true heading	Yes
\$GPHDM	H	Magnetic heading (based on GPS-derived heading and magnetic declination)	No
\$GPHDT	H	GPS-derived true heading	Yes
\$GPHEV	H	Heave value (in meters)	Yes
\$GPRMC	P	Recommended minimum specific GNSS data	Yes
\$GPROT	H	GPS-derived rate of turn (ROT)	Yes
\$GPRRE	S	Range residual and estimated position error message	Yes
\$GPVTG	V	COG and ground speed	Yes
\$GPZDA	V	Time and date	Yes
\$PCSI,1	S	Beacon status	No
\$PSAT,GBS	S	Satellite fault detection (RAIM)	Yes
\$PSAT,HPR	H	Proprietary NMEA message that provides heading, pitch, roll, and time in single message	No
\$PSAT,INTLT	H	Proprietary NMEA message that provides the pitch and roll measurements from the internal inclinometers (in degrees)	Yes
\$RD1	S	SBAS diagnostic information	Yes

Binary messages

\$JBIN Message	Description	\$JBIN Message	Description
1	GPS position	95	Satellite ephemeris data
2	GPS DOPs	96	Code and carrier phase
80	SBAS	97	Processor statistics
93	SBAS ephemeris data	98	Satellites and almanac
94	Ionosphere and UTC conversion parameters	99	GPS diagnostics

Parameters specific to \$JATT command

Parameter	Description	Query	Specify
COGTAU	Set/query COG time constant (0.0 to 3600.0 s)	X	X
CSEP	Query antenna separation	X	
GYROAID	Enable/disable gyro	X	X
HBIAS	Set/query heading bias (-180.0° to 180.0°)	X	X
HIGHMP	Set/query the High Multipath setting for use in poor GPS environments	X	X
HRTAU	Set/query time constant (0.0 to 3600.0 s)	X	X
HTAU	Set/query heading time constant (0.0 to 3600.0 s)	X	X
LEVEL	Query or enable/disable level operation	X	X
MSEP	Manually set or query antenna separation	X	X
NEGILT	Query or enable/disable negative tilt	X	X
NMEAHE	Query for the message headers or change the HDG, HDM, HDT, and ROT message headers between GP and HE	X	X
PBIAS	Set/query pitch/roll bias (-15.0° to 15.0°)	X	X
PTAU	Set/query pitch time constant (0.0 to 3600.0 s)	X	X
ROLL	Query or configure for roll or pitch GPS orientation	X	X
SEARCH	Force a new GPS heading search		X
SPDTAU	Set/query speed time constant (0.0 to 3600.0 s)	X	X
TILTAID	Query or enable/disable accelerometer, pre-calibrated	X	X
TILTCAL	Calibrate accelerometers		X



V101 and V111 GPS Compass Quick Reference Guide

Part Number: 875-0251-000 Rev A1



Installation Considerations

Proper location is important to obtain a high-precision GPS reading. Choose an installation location using either the pole or fixed mount where the V101/V111:

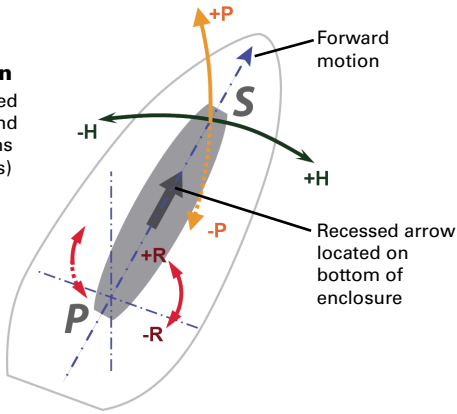
- Has a clear view of the sky
- Is away from other electronics and antennas
- Has enough cable to reach a power source
- Is on a level plane

Refer to the V101 and V111 GPS Compass User Guide for detailed installation instructions.

Mounting Orientation

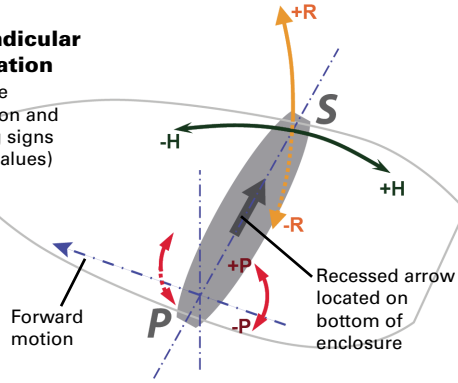
Parallel Orientation

(recommended orientation and resulting signs of HPR values)



Perpendicular Orientation

(alternate orientation and resulting signs of HPR values)



Wiring Interface

The following table provides Information for the 15 m cable and 30 m cable.

Port	Baud Rate	NMEA Messages	Default Update Rate	Wires
Port A (RS-232)	19200	GPGGA, GPVTG, GPGSV, GPZDA, GPHDT, GPROT	1 Hz	BLU BLK with BLU
Port B (RS-232)	19200	GPGGA, GPVTG, GPGSV, GPZDA, GPHDT, GPROT	1 Hz	BRN BLK with BRN
Port A (RS-422) output only	19200	GPGGA, GPVTG, GPGSV, GPZDA, GPHDT, GPROT	1 Hz	GRN BLK with GRN
Port B (RS-422) output only	19200	GPGGA, GPVTG, GPGSV, GPZDA, GPHDT, GPROT	1 Hz	YLW BLK with YLW
Power	9 - 36 VDC			RED (+) BLK (-)

Serial Port Connection

Connect the wires to a DB9 female socket using either the port A or port B configuration.

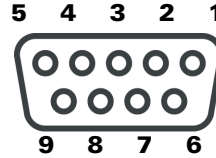
Port A DB9 RS-232 interface configuration

Pin	Wire Color	Signal
2	Blue	Port A transmit RS-232
3	Black/blue striped	Port A receive RS-232
5	Gray	Signal ground

Port B DB9 RS-232 interface configuration

Pin	Wire Color	Signal
2	Brown	Port B transmit RS-232
3	Black/brown striped	Port B receive RS-232
5	Gray	Signal ground

DB9 Female Socket Numbering



Configuration

Use a terminal program, or PocketMAX, to connect to a serial port for additional configuration requirements. Use default baud rate of 19200 bps and 8-N-1 protocol.

- Change baud rate of either port to match that of the external equipment to which the V101/111 is connected. After changing the baud rate, you must close the terminal program and reconnect at the speed selected.
- Configure NMEA messages to be output on the appropriate port.
- Select differential source (BEACON is the default on the V111).
- Input heading bias (-180° to +180°) to compensate for any offset from the centerline.
- Input bias for tilt (-15° to +15°) to compensate for any offset from horizontal.
- Enable/disable supplementary sensors (default is GYROID and TILTAID on).
- Use the \$JSAVE command to save the configuration changes when finished.

Supplemental Sensors

A tilt sensor and gyro are integrated in the V101/111. The user can turn either on or off. However, the system's performance is optimized with both on.

Sensor	Purpose	Calibration Procedure
Gyro aid	Smooth rate of turn: <ul style="list-style-type: none"> • Provides alternate source of heading for up to three minutes when GPS lock is lost • Shortens heading reacquisition time 	Will self-calibrate after several minutes To manually calibrate: <ul style="list-style-type: none"> • After heading is computed • \$JATT,GYROAID,YES • Spin Vector for one minute at less than 15° per second • Leave unit stationary for four minutes Note: It is not necessary to recalibrate with standard use because the gyro selects the calibration.
Tilt aid	<ul style="list-style-type: none"> • Smooths rate of heading • Reduces startup and reacquisition times for obtaining heading 	Precalibrated during manufacture To recalibrate: <ul style="list-style-type: none"> • Ensure Vector is level • \$JATT,TILTCAL

Common Commands and Messages

Commands

Command	Description
\$GPMSK	Tune beacon to specific frequency
\$J4STRING	Output GPGGA, GPVTG, GPGSA, GPZDA (1Hz max)
\$JAGE	Specify maximum DGPS (COAST) correction age (6 to 8100 seconds)
\$JAPP	Query or specify receiver application firmware
\$JASC	Specify ASCII messages to output to specific ports
\$JBAUD	Specify RS-232, RS-422 (output) communication rate
\$JBIN	Specify binary messages to output to specific ports
\$JDIFF	Query or specify differential correction mode
\$JGEO	Query or specify SBAS for current location and SBAS satellites
\$JI	Query unit's serial number and firmware versions
\$JOFF	Turn off all data messages
\$JQUERY, GUIDE	Query accuracy suitability for navigation
\$JRESET	Reset unit's configuration to firmware defaults. \$JRESET clears all parameters. See the V101 and V111 GPS Compass User Guide for more information.
\$JSAVE	Save session's configuration changes