

# Specifications

# Trimble SPS461 Modular GPS Heading Receiver



<b>Receiver Name</b>	<b>SPS461 GPS Heading Receiver</b>
<b>Configuration Option</b>	<b>Precise RTK</b>
Base and Rover interchangeability	No, rover only
Rover position update rate	1 Hz, 2 Hz, 5 Hz, 10 Hz, 20Hz
Rover maximum range from base radio	Unrestricted, typical range 2–5 km (1.2–3 miles) without radio repeater
Rover operation within a VRS™ network	Yes
Heading and Moving Base operation	Yes <sup>5</sup>
Factory options	
<b>General</b>	
Keyboard and display	Vacuum Fluorescent display 16 characters by 2 rows On/Off key for one-button startup Escape and Enter keys for menu navigation 4 arrow keys (up, down, left, right) for option scrolls and data entry
Dimensions (L x W x D)	24 cm x 12 cm x 5 cm (9.4 in x 4.7 in x 1.9 in) including connectors
Weight	1.22 kg (2.70 lb) receiver only 1.37 kg (3.00 lb) receiver with internal radio
<b>Antenna Options</b>	
GA510	L1/L2/L2C GPS, SBAS, and OmniSTAR (optimized for OmniSTAR)
GA530	L1/L2/L2C GPS, MSK Beacon, SBAS, and OmniSTAR
GA810	Not supported
L1/Beacon, DSM 232	L1/L2/L2C/L5 GPS, Glonass, OmniSTAR, SBAS, Galileo
Zephyr™ Model 2	L1/L2/L2C/L5 GPS, Glonass, OmniSTAR, SBAS, Galileo
Zephyr Geodetic™ Model 2	L1/L2/L2C/L5 GPS, Glonass, OmniSTAR, SBAS, Galileo
Zephyr Model 2 Rugged	Refer to antenna specification
Zephyr, Zephyr Geodetic, Z-Plus, Micro-Centered™	
<b>Temperature</b>	
Operating <sup>1</sup>	–40 °C to +65 °C (–40 °F to +149 °F)
Storage	–40 °C to +80 °C (–40 °F to +176 °F)
Humidity	MIL-STD 810F, Method 507.4
Waterproof	IP67 for submersion to depth of 1 m (3.3 ft), dustproof
<b>Shock and Vibration</b>	
Pole drop	Designed to survive a 1 m (3.3 ft) pole drop onto a hard surface
Shock – Non-operating	To 75 g, 6 ms
Shock – Operating	To 40 g, 10 ms, saw-tooth
Vibration	Tested to Trimble ATV profile (4.5 g RMS): 10 Hz to 300 Hz: 0.04 g/Hz <sup>2</sup> 300 Hz to 1,000 Hz; –6 dB/octave

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## Measurements

Advanced Trimble Maxwell™ 5 Custom GPS Chip  
High-precision multiple correlator for L1/L2 pseudo-range 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

L1/L2 signal-to-noise ratios reported in dB-Hz

Proven Trimble low elevation tracking technology  
72-channel L1 C/A code, L1/L2/L2C Full Cycle Carrier.

Trimble EVEREST™ multipath signal rejection  
4-channel SBAS (WAAS/EGNOS/MSAS)

## SBAS (WAAS/EGNOS/MSAS) Positioning<sup>3</sup>

Accuracy

Better than 5 m 3DRMS (16 ft)

## Code Differential GPS Positioning<sup>2</sup>

Horizontal accuracy

0.25 m + 1 ppm RMS (0.8 ft + 1 ppm RMS)

Vertical accuracy

0.50 m + 1 ppm RMS (1.6 ft + 1 ppm RMS)

## OmniSTAR Positioning

VBS service accuracy

Horizontal <1 m (3.3 ft)

XP service accuracy

Horizontal 0.2 m (0.66 ft), Vertical 0.3 m (1.0 ft)

HP service accuracy

Horizontal 0.1 m (0.33 ft), Vertical 0.15 m (0.5 ft)

## Location RTK Positioning

Horizontal accuracy

Vertical accuracy

## Real-Time Kinematic (RTK up to 30 km)

### Positioning<sup>2</sup>

Horizontal accuracy

8 mm + 1 ppm RMS (0.026 ft + 1 ppm RMS)

Vertical accuracy

20 mm + 1 ppm RMS (0.065 ft + 1 ppm RMS)

### Trimble VRS<sup>9</sup>

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)

## Precise Heading

Heading accuracy

2 m antenna separation

0.09° RMS

10 m antenna separation

0.05° RMS

## Initialization Time

Regular RTK operation with base station

Single/Multi-base

Minimum 10 seconds + 0.5 times baseline length in km, up to 30 km

Initialization reliability<sup>4</sup>

>99.9%

## Power

Internal

N/A

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## Power

External

Power input on the 26-pin D-sub connector is optimized for lead acid batteries with a cut-off threshold of 11 V DC

DC external power input with over-voltage protection  
Receiver automatically turns on when connected to external power  
44 V DC to 57 V DC, IEEE802.3af compliant device

Power over Ethernet (PoE)

Power consumption

6.0 W in rover mode with internal receive radio

## Operation Time on Internal Battery

Rover

N/A

Base station

N/A

450 MHz systems

900 MHz systems

## Regulatory Approvals

FCC: Part 15 Subpart B (Class B Device) and Subpart C, Part 90  
Canadian ICES-003. Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.  
Canadian RSS-310, RSS-210, and RSS-119.  
Cet appareil est conforme à la norme CNR-310, CNR-210, et CNR-119 du Canada.

R&TTE Directive: EN 301 489-1/-5/-17, EN 300 440, EN 300 328, EN 300 113, EN 60950, EN 50371

ACMA: AS/NZS 4295 approval  
CE mark compliance  
C-tick mark compliance  
RoHS compliant  
WEEE compliant

## Communications

Lemo (Serial)

N/A

Modem 1 (Serial)

26-pin D-sub, Serial 2, Full 9-wire RS232, using adaptor cable

Modem 2 (Serial)

26-pin D-sub, Serial 3, 3 wire RS-232, using adaptor cable

1PPS (1 Pulse-per-second)

Available

Ethernet

Through a multi-port adaptor

Bluetooth wireless technology

Fully-integrated, fully-sealed 2.4 GHz Bluetooth module<sup>6</sup>

Integrated radios (optional)

Fully-integrated, fully-sealed internal MSK Beacon and 450 MHz (UHF) Rx only,  
Internal MSK Beacon only or Internal 900 MHz Rx only

Channel spacing (450 MHz)

12.5 kHz or 25 kHz spacing available

450 MHz output power

N/A

900 MHz output power

N/A

Frequency approvals (900 MHz)

N/A

External GSM/GPRS, cell phone support

Supported for direct-dial and Internet-based correction streams

Cell phone or GSM/GPRS modem inside controller

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Internal MSK Beacon receiver	If internal MSK Beacon radio is installed <sup>7</sup> Frequency range 283.5–325.0 kHz Channel spacing 500 Hz MSK bit rate 50, 100, and 200 bps Demodulation minimum shift key (MSK)
Receiver position update rate	1 Hz, 2 Hz, 5 Hz, 10 Hz, and 20 Hz positioning
Correction data input	CMR™, CMR+™, CMRx, RTCM 3, RTCM 2.x
Correction data output	Repeat DGPS RTCM from MSK Beacon or OmniSTAR VBS source
Data outputs	NMEA, GSOF, 1PPS Time Tags

## Receiver Upgrades

## Notes

1 Receiver will operate normally to  $-40^{\circ}\text{C}$ .

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

3 Depends on SBAS system performance.

4 May be affected by atmospheric conditions, signal multipath, and satellite geometry. Initialization reliability is continuously monitored to ensure highest quality.

5 Two of the supported antennas (See Antenna Options) must be connected for heading.

6 Bluetooth type approvals are country specific. For more information, contact your local Trimble office or representative.

7 One of the antennas must be a GA530 for MSK Beacon signal reception.

Specifications subject to change without notice.

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