

# Specifications

# Trimble SPS361 Modular GPS Heading Receiver



Receiver Name	SPS361 GPS Heading Receiver
<b>Configuration Option</b>	<b>DGPS</b>
Type	Modular
Base and rover interchangeability	No, rover only
Base operation	NA
Rover operation	All models
Heading operation	All models <sup>5</sup>
Rover position update rate	1 Hz, 2 Hz, 5 Hz, 10 Hz, 20Hz
Rover maximum range from base	Unlimited
Rover operation within a VRS™ network	DGPS only
Factory options	NA
<b>General</b>	
Keyboard and display	VFD 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 × W × D)	24 cm (9.4 in) × 12 cm (4.7 in) × 5 cm (1.9 in) including connectors
Weight	1.22 kg (2.70 lb) receiver only 1.34 kg (2.95 lb) receiver with internal beacon radio
<b>Antenna Options</b>	
GA510	L1/L2 GPS, SBAS, and OmniSTAR (optimized for OmniSTAR)
GA530	L1/L2 GPS, MSK Beacon, SBAS, and OmniSTAR not supported
L1/Beacon, DSM 232	L1/L2 GPS, SBAS, and OmniSTAR
Zephyr™ Model 2	L1/L2 GPS, SBAS, and OmniSTAR
Zephyr Geodetic™ Model 2	L1/L2 GPS, SBAS, and OmniSTAR
Zephyr Model 2 Rugged	L1/L2 GPS, SBAS, and OmniSTAR
Zephyr, Zephyr Geodetic, Z-Plus, Micro-Centered™	Refer to antenna specification
<b>Temperature</b>	
Operating	−40 °C to +65 °C (−40 °F to +149 °F) <sup>1</sup>
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>	
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

# Specifications

# Trimble SPS361 Modular GPS Heading Receiver

## 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 Full Cycle Carrier

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

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

Correction type	DGPS RTCM 2.x
Correction source	DGPS Base via radio or Internet
Horizontal accuracy	$\pm(0.25\text{m} + 1 \text{ ppm})$ RMS $\pm(0.8 \text{ ft} + 1 \text{ ppm})$
Vertical accuracy	$\pm(0.50\text{m} + 1 \text{ ppm})$ RMS $\pm(1.6 \text{ ft} + 1 \text{ ppm})$

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

Horizontal accuracy	Typically <1 m (3.3 ft)
Vertical accuracy	Typically <5 m (16.4 ft)

## OmniSTAR Positioning

VBS service accuracy	Horizontal <1 m (3.3 ft)
XP service accuracy	NA
HP service accuracy	NA

## Location RTK Positioning<sup>2</sup>

Horizontal accuracy	NA
Vertical accuracy	NA

## Precise Heading

Heading accuracy	
2 m antenna separation	0.09° RMS
10 m antenna separation	0.05° RMS

## Power

Internal	NA
----------	----

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  
11 V DC to 28 V DC external power input with over-voltage protection

Receiver automatically turns on when connected to external power

Power over Ethernet (PoE)

44 V DC to 57 V DC, IEEE802.3af compliant device

Power consumption

6.0 W in rover mode with internal MSK Beacon receiver

# Specifications

# Trimble SPS361 Modular GPS Heading Receiver

## Operation Time on Internal Battery

Rover	NA
Base station	NA
450 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) NA

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>4</sup>

Integrated radios (optional) Fully-integrated, fully-sealed internal MSK Beacon radio

Channel spacing (450 MHz) NA

450 MHz output power NA

900 MHz output power NA

Frequency approvals (900 MHz) NA

External GSM/GPRS, cell phone support Supported for direct-dial and Internet-based correction streams

Cell phone or GSM/GPRS modem inside controller

Internal MSK Beacon receiver If internal MSK Beacon Radio is installed<sup>6</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)

Correction data input RTCM 2.x

Correction data output Repeat RTCM from MSK Beacon or OmniSTAR VBS source

Data outputs NMEA, GSO, 1PPS Time Tags

## Receiver Upgrades

Not Upgradable

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

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

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

Specifications subject to change without notice.

© 2009, Trimble Navigation Limited. All rights reserved. Trimble, the Globe & Triangle logo, and TSC2 are trademarks of Trimble Navigation Limited, registered in the United States and in other countries. CMR, CMR+, EVEREST, Maxwell, Micro-Centered, VRS, Zephyr, and Zephyr Geodetic are trademarks of Trimble Navigation Limited. The Bluetooth word mark and logos are owned by the Bluetooth SIG, Inc. and any use of such marks by Trimble Navigation Limited is under license. All other trademarks are the property of their respective owners. PN 022482-1615

### Trimble Heavy and Highway Business Area

5475 Kellenburger Road  
Dayton, Ohio 45424  
USA

800-538-7800 (Toll Free)  
+1-937-245-5154 Phone  
+1-937-233-9441 Fax

[www.trimble.com](http://www.trimble.com)

### Trimble Authorized Distribution Partner

# Specifications

# Trimble SPS461 Modular GPS Heading Receiver



<b>Receiver Name</b>	<b>SPS461 GPS Heading Receiver</b>
<b>Configuration Option</b>	<b>DGPS</b>
Type	Modular
Base and rover interchangeability	No, rover only
Base operation	NA
Rover operation	All models
Heading operation	All models <sup>5</sup>
Rover position update rate	1 Hz, 2 Hz, 5 Hz, 10 Hz, 20Hz
Rover maximum range from base	Unlimited
Rover operation within a VRS™ network	DGPS only
Factory options	Location RTK, OmniSTAR HP/XP, Precise Vertical, Precision RTK
<b>General</b>	
Keyboard and display	VFD 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 × W × D)	24 cm (9.4 in) × 12 cm (4.7 in) × 5 cm (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 GPS, SBAS, and OmniSTAR (optimized for OmniSTAR)
GA530	L1/L2 GPS, MSK Beacon, SBAS, and OmniSTAR
L1/Beacon, DSM 232	Not supported
Zephyr™ Model 2	L1/L2 GPS, SBAS, and OmniSTAR
Zephyr Geodetic™ Model 2	L1/L2 GPS, SBAS, and OmniSTAR
Zephyr Model 2 Rugged	L1/L2 GPS, SBAS, and OmniSTAR
Zephyr, Zephyr Geodetic, Z-Plus, Micro-Centered™	Refer to antenna specification
<b>Temperature</b>	
Operating	-40 °C to +65 °C -40 °F to +149 °F <sup>1</sup>
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>	
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

# Specifications

# Trimble SPS461 Modular GPS Heading Receiver

## 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 Full Cycle Carrier

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

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

Correction type DGPS RTCM 2.x  
Correction source DGPS Base via radio or Internet  
Horizontal accuracy  $\pm(0.25\text{m} + 1 \text{ ppm})$  RMS  $\pm(0.8 \text{ ft} + 1 \text{ ppm})$   
Vertical accuracy  $\pm(0.50\text{m} + 1 \text{ ppm})$  RMS  $\pm(1.6 \text{ ft} + 1 \text{ ppm})$

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

Horizontal accuracy Typically <1 m (3.3 ft)  
Vertical accuracy Typically <5 m (16.4 ft)

## OmniSTAR Positioning

VBS service accuracy Horizontal <1 m (3.3 ft)  
XP service accuracy NA  
HP service accuracy NA

## Location RTK Positioning<sup>2</sup>

Horizontal accuracy NA  
Vertical accuracy NA

## Precise Heading

Heading accuracy  
2 m antenna separation 0.09° RMS  
10 m antenna separation 0.05° RMS

## Power

Internal NA

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  
11 V DC to 28 V DC external power input with over-voltage protection

Receiver automatically turns on when connected to external power

Power over Ethernet (PoE)

44 V DC to 57 V DC, IEEE802.3af compliant device

Power consumption

6.0 W in rover mode with internal receive radio

# Specifications

# Trimble SPS461 Modular GPS Heading Receiver

## Operation Time on Internal Battery

Rover	NA
Base station	NA
450 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)	NA
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>4</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	NA
900 MHz output power	NA
Frequency approvals (900 MHz)	NA

External GSM/GPRS, cell phone support

Supported for direct-dial and Internet-based correction streams

Cell phone or GSM/GPRS modem inside controller

Internal MSK Beacon receiver

If internal MSK Beacon Radio is installed<sup>6</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)

Correction data input

RTCM 2.x

Correction data output

Repeat DGPS RTCM from MSK Beacon or OmniSTAR VBS source

Data outputs

NMEA, GSO, 1PPS Time Tags

## Receiver Upgrades

Location RTK OmniSTAR, Location RTK PV, Precise RTK

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

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

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

Specifications subject to change without notice.

© 2009, Trimble Navigation Limited. All rights reserved. Trimble, the Globe & Triangle logo, and TSC2 are trademarks of Trimble Navigation Limited, registered in the United States and in other countries. CMR, CMR+, EVEREST, Maxwell, Micro-Centered, VRS, Zephyr, and Zephyr Geodetic are trademarks of Trimble Navigation Limited. The Bluetooth word mark and logos are owned by the Bluetooth SIG, Inc. and any use of such marks by Trimble Navigation Limited is under license. All other trademarks are the property of their respective owners. PN 022482-1610

## Trimble Heavy and Highway Business Area

5475 Kellenburger Road

Dayton, Ohio 45424

USA

800-538-7800 (Toll Free)

+1-937-245-5154 Phone

+1-937-233-9441 Fax

[www.trimble.com](http://www.trimble.com)

## Trimble Authorized Distribution Partner



# Specifications

# Trimble SPS461 Modular GPS Heading Receiver



<b>Receiver Name</b>	<b>SPS461 GPS Heading Receiver</b>
<b>Configuration Option</b>	<b>Location RTK OmniSTAR</b>
Type	Modular
Base and rover interchangeability	No, rover only
Base operation	NA
Rover operation	All models
Heading operation	All models <sup>5</sup>
Rover position update rate	1 Hz, 2 Hz, 5 Hz, 10 Hz, 20Hz
Rover maximum range from base	Unlimited
Rover operation within a VRS™ network	Yes
Factory options	
<b>General</b>	
Keyboard and display	VFD 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 × W × D)	24 cm (9.4 in) × 12 cm (4.7 in) × 5 cm (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 GPS, SBAS, and OmniSTAR (optimized for OmniSTAR)
GA530	L1/L2 GPS, MSK Beacon, SBAS, and OmniSTAR
L1/Beacon, DSM 232	Not supported
Zephyr™ Model 2	L1/L2 GPS, SBAS, and OmniSTAR
Zephyr Geodetic™ Model 2	L1/L2 GPS, SBAS, and OmniSTAR
Zephyr Model 2 Rugged	L1/L2 GPS, SBAS, and OmniSTAR
Zephyr, Zephyr Geodetic, Z-Plus, Micro-Centered™	Refer to antenna specification
<b>Temperature</b>	
Operating	-40 °C to +65 °C (-40 °F to +149 °F) <sup>1</sup>
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>	
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

# Specifications

# Trimble SPS461 Modular GPS Heading Receiver

## 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 Full Cycle Carrier

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

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

Correction type DGPS RTCM 2.x  
Correction source DGPS Base via radio or Internet  
Horizontal accuracy  $\pm(0.25\text{m} + 1 \text{ ppm})$  RMS  $\pm(0.8 \text{ ft} + 1 \text{ ppm})$   
Vertical accuracy  $\pm(0.50\text{m} + 1 \text{ ppm})$  RMS  $\pm(1.6 \text{ ft} + 1 \text{ ppm})$

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

Horizontal accuracy Typically <1 m (3.3 ft)  
Vertical accuracy Typically <5 m (16.4 ft)

## 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<sup>2</sup>

Horizontal accuracy 0.07 m + 1 ppm RMS (0.23 ft + 1 ppm RMS)  
Vertical accuracy 0.10 m + 1 ppm RMS (0.33 ft + 1 ppm RMS)

## Precise Heading

Heading accuracy  
2 m antenna separation 0.09° RMS  
10 m antenna separation 0.05° RMS

## Power

Internal NA

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  
11 V DC to 28 V DC external power input with over-voltage protection

Receiver automatically turns on when connected to external power

Power over Ethernet (PoE)

44 V DC to 57 V DC, IEEE802.3af compliant device

Power consumption

6.0 W in rover mode with internal receive radio

# Specifications

# Trimble SPS461 Modular GPS Heading Receiver

## Operation Time on Internal Battery

Rover	NA
Base station	NA
450 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)	NA
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>4</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	NA
900 MHz output power	NA
Frequency approvals (900 MHz)	NA

External GSM/GPRS, cell phone support

Supported for direct-dial and Internet-based correction streams

Cell phone or GSM/GPRS modem inside controller

Internal MSK Beacon receiver

If internal MSK Beacon Radio is installed<sup>6</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)

Correction data input

CMR™, CMR+™, RTCM 3, RTCM 2.x

Correction data output

Repeat DGPS RTCM from MSK Beacon or OmniSTAR VBS source

Data outputs

NMEA, GSO, 1PPS Time Tags

## Receiver Upgrades

### Notes

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

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

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

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

Specifications subject to change without notice.

© 2009, Trimble Navigation Limited. All rights reserved. Trimble, the Globe & Triangle logo, and TSC2 are trademarks of Trimble Navigation Limited, registered in the United States and in other countries. CMR, CMR+, EVEREST, Maxwell, Micro-Centered, VRS, Zephyr, and Zephyr Geodetic are trademarks of Trimble Navigation Limited. The Bluetooth word mark and logos are owned by the Bluetooth SIG, Inc. and any use of such marks by Trimble Navigation Limited is under license. All other trademarks are the property of their respective owners. PN 022482-1611

### Trimble Heavy and Highway Business Area

5475 Kellenburger Road

Dayton, Ohio 45424

USA

800-538-7800 (Toll Free)

+1-937-245-5154 Phone

+1-937-233-9441 Fax

[www.trimble.com](http://www.trimble.com)

### Trimble Authorized Distribution Partner

# Specifications

# Trimble SPS461 Modular GPS Heading Receiver



<b>Receiver Name</b>	<b>SPS461 GPS Heading Receiver</b>
<b>Configuration Option</b>	<b>Location RTK PV (Precise Vertical)</b>
Type	Modular
Base and rover interchangeability	No, rover only
Base operation	NA
Rover operation	All models
Heading operation	All models <sup>5</sup>
Rover position update rate	1 Hz, 2 Hz, 5 Hz, 10 Hz, 20Hz
Rover maximum range from base	Unlimited
Rover operation within a VRS™ network	Yes
Factory options	
<b>General</b>	
Keyboard and display	VFD 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 × W × D)	24 cm (9.4 in) × 12 cm (4.7 in) × 5 cm (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 GPS, SBAS, and OmniSTAR (optimized for OmniSTAR)
GA530	L1/L2 GPS, MSK Beacon, SBAS, and OmniSTAR
L1/Beacon, DSM 232	Not supported
Zephyr™ Model 2	L1/L2 GPS, SBAS, and OmniSTAR
Zephyr Geodetic™ Model 2	L1/L2 GPS, SBAS, and OmniSTAR
Zephyr Model 2 Rugged	L1/L2 GPS, SBAS, and OmniSTAR
Zephyr, Zephyr Geodetic, Z-Plus, Micro-Centered™	Refer to antenna specification
<b>Temperature</b>	
Operating	-40 °C to +65 °C (-40 °F to +149 °F) <sup>1</sup>
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>	
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

# Specifications

# Trimble SPS461 Modular GPS Heading Receiver

## 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 Full Cycle Carrier

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

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

Correction type DGPS RTCM 2.x  
Correction source DGPS Base via radio or Internet  
Horizontal accuracy  $\pm(0.25\text{m} + 1 \text{ ppm})$  RMS  $\pm(0.8 \text{ ft} + 1 \text{ ppm})$   
Vertical accuracy  $\pm(0.50\text{m} + 1 \text{ ppm})$  RMS  $\pm(1.6 \text{ ft} + 1 \text{ ppm})$

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

Horizontal accuracy Typically <1 m (3.3 ft)  
Vertical accuracy Typically <5 m (16.4 ft)

## 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<sup>2</sup>

Horizontal accuracy 0.07 m + 1 ppm RMS (0.23 ft + 1 ppm RMS)  
Vertical accuracy 0.02 m + 1 ppm RMS (0.065 ft + 1 ppm RMS)

## Precise Heading

Heading accuracy  
2 m antenna separation 0.09° RMS  
10 m antenna separation 0.05° RMS

## Power

Internal NA

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  
11 V DC to 28 V DC external power input with over-voltage protection

Receiver automatically turns on when connected to external power

Power over Ethernet (PoE)

44 V DC to 57 V DC, IEEE802.3af compliant device

Power consumption

6.0 W in rover mode with internal receive radio

# Specifications

# Trimble SPS461 Modular GPS Heading Receiver

## Operation Time on Internal Battery

Rover	NA
Base station	NA
450 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)	NA
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>4</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	NA
900 MHz output power	NA
Frequency approvals (900 MHz)	NA

External GSM/GPRS, cell phone support Supported for direct-dial and Internet-based correction streams

Cell phone or GSM/GPRS modem inside controller

Internal MSK Beacon receiver If internal MSK Beacon Radio is installed<sup>6</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)

Correction data input CMR™, CMR+™, RTCM 3, RTCM 2.x  
Correction data output Repeat DGPS RTCM from MSK Beacon or OmniSTAR VBS source  
Data outputs NMEA, GSO, 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 Bluetooth type approvals are country specific. For more information, contact your local Trimble office or representative.

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

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

Specifications subject to change without notice.

© 2009, Trimble Navigation Limited. All rights reserved. Trimble, the Globe & Triangle logo, and TSC2 are trademarks of Trimble Navigation Limited, registered in the United States and in other countries. CMR, CMR+, EVEREST, Maxwell, Micro-Centered, VRS, Zephyr, and Zephyr Geodetic are trademarks of Trimble Navigation Limited. The Bluetooth word mark and logos are owned by the Bluetooth SIG, Inc. and any use of such marks by Trimble Navigation Limited is under license. All other trademarks are the property of their respective owners. PN 022482-1612

### Trimble Heavy and Highway Business Area

5475 Kellenburger Road

Dayton, Ohio 45424

USA

800-538-7800 (Toll Free)

+1-937-245-5154 Phone

+1-937-233-9441 Fax

[www.trimble.com](http://www.trimble.com)

### Trimble Authorized Distribution Partner



# 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	Unrestricted, typical range 2–5 km (1.2–3 miles) without radio repeater
Rover operation within a VRS™ network	Yes
Heading operation	Yes <sup>5</sup>
Factory options	
<b>General</b>	
Keyboard and display	VFD 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
L1/Beacon, DSM 232	Not supported
Zephyr™ Model 2	L1/L2/L2C GPS, SBAS, and OmniSTAR
Zephyr Geodetic™ Model 2	L1/L2/L2C GPS, SBAS, and OmniSTAR
Zephyr Model 2 Rugged	L1/L2/L2C GPS, SBAS, and OmniSTAR
Zephyr, Zephyr Geodetic, Z-Plus, Micro-Centered™	Refer to antenna specification
<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

# Specifications

# Trimble SPS461 Modular GPS Heading Receiver

## 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)

## 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)

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

Horizontal accuracy

Typically <1 m (3.3 ft)

Vertical accuracy

Typically <5 m (16.4 ft)

## 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)

## Real-Time Kinematic (RTK) Positioning

Horizontal accuracy

10 mm + 1 ppm RMS (0.032 ft + 1 ppm RMS)

Vertical accuracy

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

## 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

RTK operation with Scalable GPS infrastructure

Typically <30 seconds anywhere within coverage area

Initialization reliability<sup>4</sup>

>99.9%

## Power

Internal

NA

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

11 V DC to 28 V DC external power input with over-voltage protection

Receiver automatically turns on when connected to external power

# Specifications

# Trimble SPS461 Modular GPS Heading Receiver

Power over Ethernet (PoE) 44 V DC to 57 V DC, IEEE802.3af compliant device

Power consumption 6.0 W in rover mode with internal receive radio

## Operation Time on Internal Battery

Rover NA

Base station NA

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) NA

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

12.5 kHz or 25 kHz spacing available

Channel spacing (450 MHz)

450 MHz output power NA

900 MHz output power NA

Frequency approvals (900 MHz) NA

External GSM/GPRS, cell phone support Supported for direct-dial and Internet-based correction streams

Cell phone or GSM/GPRS modem inside controller

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+™, RTCM 3, RTCM 2.x

Correction data output Repeat DGPS RTCM from MSK Beacon or OmniSTAR VBS source

Data outputs NMEA, GSOE, 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

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

Specifications subject to change without notice.

© 2009, Trimble Navigation Limited. All rights reserved. Trimble, the Globe & Triangle logo, and TSC2 are trademarks of Trimble Navigation Limited, registered in the United States and in other countries. CMR, CMR+, EVEREST, Maxwell, Micro-Centered, VRS, Zephyr, and Zephyr Geodetic are trademarks of Trimble Navigation Limited. The Bluetooth word mark and logos are owned by the Bluetooth SIG, Inc. and any use of such marks by Trimble Navigation Limited is under license. All other trademarks are the property of their respective owners. PN 022482-1614.

### Trimble Heavy and Highway Business Area

5475 Kellenburger Road

Dayton, Ohio 45424

USA

800-538-7800 (Toll Free)

+1-937-245-5154 Phone

+1-937-233-9441 Fax

[www.trimble.com](http://www.trimble.com)

### Trimble Authorized Distribution Partner