



SPS986

GNSS SMART ANTENNA

RUGGED, RELIABLE POSITIONING

The ultra-rugged Trimble® SPS986 GNSS Smart Antenna offers unmatched reliability for construction site positioning. Ideal for use on small and large job sites, the SPS986 can serve as a GNSS rover system or as a base station for other GNSS operations including machine control.



Ultra-rugged housing built to withstand harsh construction site conditions

Sensor onboard shows verticality on field controller screen

GNSS receiver, antenna, and battery in one unit

Connected site enabled with integrated Wi-Fi®, Bluetooth®, and wideband radio

Quick release connector makes it easy to move the unit between case, range pole, ATV, and truck

Key Benefits

Trimble's SPS986 GNSS Smart Antenna is faster and scalable, has a longer battery life and incorporates the latest technology to make construction surveying easier, safer and more productive.

Rugged, All-In-One Solution

- ▶ Combines unprecedented strength and durability into a compact form that is easy to use and virtually indestructible
- ▶ The most rugged receiver Trimble has ever built, so you won't experience downtime with equipment that doesn't work
- ▶ Save time by wirelessly synchronizing progress data and as-built information to the job supervisor or head office and receive updated design information back without ever leaving the jobsite
- ▶ Receives Real-Time Kinematic (RTK) corrections via the internal wideband radio, Wi-Fi or the internet so you can obtain higher accuracy site measurements such as grade checking; construction crews can spend more time doing the work and less time setting up and maintaining the equipment
- ▶ Utilizes more GNSS constellations, satellites and signals to increase productivity and uptime with greater accuracy in challenging conditions such as under tree canopy and in urban areas
- ▶ Conduct your own high-accuracy site measurement tasks and save on contract personnel costs

Trimble xFill Technology

Trimble xFill technology expands site productivity by allowing short excursions into valleys and other locations where GNSS corrections were not previously available.

Flexibility

Can be easily moved from carrying case to range pole, tripod, t-bar or vehicle with a single click, so you can get going faster no matter the operation technique.

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KEY FEATURES

The SPS986 is engineered to stand up to the most dynamic and rugged jobsite measurement applications. The integrated smart antenna design and quick release connector make it easy to transport and set up on a range pole, ATV or supervisor truck.

The SPS986 can move from one site measurement application to another with one quick release, saving set up time and maximizing use time. For example, a grade checker can mount the SPS986 to an all terrain vehicle and conduct site topos, check as-builts, and road center lines in even the roughest site conditions. The SPS986 can withstand the high vibration scenarios often seen on ATV-mounted site work without interruption or fear of damage.

With Trimble SPS Field Controller Software, you can:

- ▶ Determine cut/fill on a range pole, utility vehicle, or truck
- ▶ Record tilt data when taking measurements
- ▶ Stake out site or road features, utilities, daylight lines and side slopes
- ▶ Measure progress and calculate material stockpile volumes
- ▶ Carry out as-built measurements, grade checks and laid material thickness checks

The SPS986 integrates numerous timesaving features in a compact and rugged system. It has never been so quick and easy to get measuring. Initial site work and topo can even be done base station free using satellite delivered GNSS corrections to the rover.

The Trimble GNSS Status App can be used to quickly check the health and status of the receiver using your smartphone. If more detail is needed, Trimble Web UI can be accessed over Wi-Fi. Setting a new standard for rugged reliability, the SPS986 GNSS Smart Antenna keeps your crews working, not wasting time with GNSS maintenance.

With the onboard sensor, users can now see the verticality of the receiver while viewing the field controller software, instead of needing to focus on the rod bubble. SPS Field Controller Software stores the verticality data when recording points. Especially in the dark, work more efficiently and save time getting the job done.

Reliable Base Station

The SPS986 can also serve as a powerful site base station, using integrated Wi-Fi or optional radio to send and receive corrections for rover or machine control work. It is the easiest base station on the market – just put it on the tripod, switch it on, and you're ready to go. The SPS986 will automatically establish a connection with the machine radio or GNSS rover and begin transmitting corrections.

With Trimble's latest Maxwell™ technology, the SPS986 GNSS Smart Antenna can "see" more GNSS constellations and signals than traditional GPS, so you can expect greater accuracy in more challenging conditions such as under tree canopy and in congested construction sites. That also means more uptime using the system and more productivity for your job crews.



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Specifications

Trimble SPS986 GNSS Smart Antenna



| | |
|---------------------------------------|--|
| Receiver Name | SPS986 GNSS Smart Antenna |
| Configuration Option | |
| Base and Rover interchangeability | Yes, upgradeable to Rover, Base or Rover / Base |
| Rover position update rate | 1 Hz, 2 Hz, 5 Hz, 10 Hz, 20 Hz |
| 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 - option[7] |
| Factory options | See Receiver Upgrades below |
| General | |
| Keyboard and display | LED indicators for satellite tracking, radio link status, WiFi and power On/Off key for one-button startup |
| Dimensions (L × W × D) | 13.9 cm (5.5 in) Diameter × 13 cm (5.1 in) including connectors |
| Weight | 1.55 kg (3.42 lb) receiver only including radio and battery Complete system (rover including controller and pole) 3.9 kg (8.6 lbs) |
| Temperature | |
| Operating[1] | –40 °C to +65 °C (–40 °F to +149 °F) |
| Storage | –40 °C to +75 °C (–40 °F to +167 °F) |
| Humidity | 100%, condensing |
| Ingress protection | IP68 Certified per IEC-60529 - waterproof/dustproof (1m submersion for 1hr) |
| Shock and Vibration | |
| Pole drop | Designed to survive a 2 m (6.6 ft) pole drop onto concrete |
| Shock – Non-operating | 75 Gs at 6msec |
| Shock – Operating | 40 Gs at 10msec |
| Vibration | Mil-Std-810G, FIG 514.6E-1 Cat 24, Mil-Std-202G, FIG 214-1, Condition D |
| Measurements | |
| | Advanced Trimble Technology Custom GNSS 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 |
| | Trimble EVEREST+ multipath signal rejection |
| | MSS Band: CenterPoint RTX and OmniSTAR by subscription |
| | Trimble xFill for short gaps in correction messages |
| | GPS L1 C/A, L2C, L2E (Trimble method for tracking unencrypted L2P) upgradable to L5. 672 channels |
| | Upgradeable to GLONASS L1/L2C/A, L2P Full Cycle Carrier |
| | Upgrade to Galileo L1 CBOC, E5A, E5B & E5AltBOC8 and BeiDou B1,B1C, B2,B3 Able to track 3rd generation BeiDou signals |
| | Integrated MEM's sensor for eBubble |
| | 4-channel SBAS L1 C/A, L5 (WAAS/EGNOS/MSAS/GAGAN) QZSS: L1 C/A, L1C, L1 SAIF, L2C, L5 Able to track NavIC (IRNSS) L5 |

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Trimble SPS986 GNSS Smart Antenna



SBAS (WAAS/EGNOS/MSAS) Positioning[3]

Accuracy Horizontal $\pm 0.50\text{m}$ (1.6 ft), Vertical $\pm 0.85\text{m}$ (2.8 ft)

Code Differential GPS Positioning[2]

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)

CenterPoint® RTX Positioning

Accuracy[12] Horizontal 2cm (0.06 ft) RMS, Vertical 5cm (0.16 ft) RMS

Convergence time for specified precisions[12] 5 minutes in select regions, and within 30 minutes worldwide

xFill Positioning

xFill accuracy RTK11 + 10mm(0.03 ft)/min Horiz. + 20mm(0.06 ft)/min Vert. RMS

Location RTK Positioning

Horizontal accuracy Location RTK (10/10) or (10/2) 10 cm + 1 ppm RMS (0.32 ft + 1 ppm)

Vertical accuracy Location RTK (10/10) 10 cm + 1 ppm RMS (0.32 ft + 1 ppm)

Real-Time Kinematic (RTK up to 30 km)

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)

Tilt Compensation (RTK, < 30° of tilt)[13]

Horizontal accuracy 8 mm RTK + 8 mm Tilt Compensation + 0.5 mm per degree of tilt + 1 ppm

Vertical accuracy RMS (0.026 ft + 0.026 ft + 0.001 ft + 1 ppm RMS)

15 mm + 1 ppm RMS (0.05 ft + 1 ppm RMS)

Trimble VRS[9]

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 When combined with SPS986[7]

2 m antenna separation 0.09° RMS

10 m antenna separation 0.05° RMS

High Precision Static

Horizontal accuracy 3 mm + 0.1 ppm RMS (0.01 ft + 0.1 ppm)

Vertical accuracy 3.5 mm + 0.4 ppm RMS (0.011 ft + 0.4 ppm)

Initialization Time

Regular RTK operation with base station Single/Multi-base

typically less than 8 seconds

Initialization reliability[4] >99.9%

Power

Internal Rechargeable, removable 7.4 V, 2.8 Ah Lithium-ion battery in internal battery

Internal battery operates as a UPS during an ext power source failure

Internal battery will charge from external power source as long as source can

integrated charging circuitry

Power

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|---|--|
| External | External power input with over-voltage protection on Port 1 (7-pin Lemo 2-key). Minimum 10.8 V, Maximum 28 VDC, shutdown optimized for 12V lead acid battery operation |
| | Power source supply (Internal/External) is hot-swap capable in the event of DC external power input with over-voltage protection on Port 1 (Lemo) Receiver automatically turns on when connected to external power |
| Power over Ethernet (PoE) | N/A |
| Power consumption | 3.2 W in rover mode with internal receive radio 5.2 W in base mode with internal 0.5 W transmit radio |
| Operation Time on Internal Battery | |
| Rover | 5.5 hours; varies with temperature |
| Base station | |
| 450 MHz systems | Approximately 4 hours; varies with temperature[5] |
| 900 MHz systems | Approximately 4 hours; varies with temperature |
| Regulatory Approvals | |
| | FCC Part 15 Subpart B (Class B Device), Part 15.247, 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. |
| | IEC 60950-1 2nd Edition CISPR 32, EN 55032, EN55024 RCM mark,ANS/NZS 4768 |
| | Radio Equipment Directive (RED 2014/53/EU) |
| | Japan MIC |
| | CE mark |
| | RoHS compliance |
| | WEEE compliance |
| Communications | |
| Lemo (Serial 1) | 7-pin Lemo 2-key, Power Input, USB. Optional USB to RS232 serial cable. |
| 1PPS (1 Pulse-per-second) | Receiver supports PPS communications over USB |
| Ethernet | N/A |
| WiFi | Client or Access Point. Receive or transmit corrections. WiFi b/g |
| Bluetooth wireless technology | Fully-integrated, sealed 2.4 GHz Bluetooth module[6]. |
| Integrated radios (optional) | Fully-integrated, fully-sealed internal 403-473 MHz; Internal 900 MHz; Rx/Tx |
| Channel spacing (450 MHz) | 12.5 kHz or 25 kHz spacing available |
| Sensitivity (450 MHz) | -114 dBm (12 dB SINAD) |
| 450 MHz output power | 0.5 W, 2W |
| 900 MHz output power | 1.0 W |
| Frequency approvals (902-928 MHz) | USA/Canada |

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| External GSM/GPRS, cell phone support | Supported for direct-dial and Internet-based correction streams using the Cell phone or GSM/GPRS modem inside external controller |
| Receiver position update rate | 1 Hz, 2 Hz, 5 Hz, 10 Hz, and 20 Hz positioning |
| Correction data input | CMR™, CMR+™, CMRx™, RTCM 2.x, RTCM 3 (require Rover upgrade) |
| Correction data output | CMR, CMR+, CMRx, RTCM 2.x, RTCM 3 (require Base upgrade) |
| Data outputs | NMEA, GSOF |
| Receiver Upgrades | |
| Precision upgrades | Location RTK (10/2), (10/10), or (30/30) Precision RTK Rover, Base or Rover/Base. IMU (Tilt Correction) |
| Signal / Constellation upgrades | L5 (Triple Frequency), GLONASS, GALILEO, BeiDou GNSS[10] |
| Feature upgrades | 4 GB Internal Data Logging. Moving Base and Heading |

Notes

- 1 Receiver will operate normally to those temperature limits. Internal batteries
- 2 Accuracy and reliability may be subject to anomalies such as multipath, obstructions, satellite geometry, interference and atmospheric conditions. Always follow recommended survey 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 If your receiver is transmitting 2.0 W (450 MHz), you will experience reduced battery performance compared to the OEM specification.
- 6 Bluetooth type approvals are country specific. For more information, contact your local Trimble office or representative.
- 7 When receiver is combined with an SPS986 with Moving Base installed or other suitable SPS receivers.
- 8 Galileo Commercial Authorization
Developed under a Licence of the European Union and the European Space Agency.
- 9 Networked RTK PPM values are referenced to the closest physical base
- 10 This Trimble SPS Receiver is capable of supporting existing and planned GNSS satellite signals, including GPS, GLONASS, GALILEO, BeiDou and QZSS, and existing and planned augmentations to these GNSS systems.
- 11 RTK refers to the last reported precision before the correction source was lost and xFill started
- 12 Receiver accuracy and convergence time varies based on GNSS constellation health, level of multipath, and proximity to obstructions such as large trees and buildings.
- 13 Proper survey techniques should be followed to reduce multipath error and maintain a good line of sight to the sky for satellite tracking. At greater than 30° of tilt, accuracy at the rod tip may decrease more than specified.

Specifications

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Specifications subject to change without notice.

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