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# Trimble SPS850 Modular GPS Receiver

## Flexible modular receiver for permanent base station, mobile base station and rover operations for GPS modernization

### General Description

The Trimble® SPS850 Modular GPS Receiver sets new standards for fast setup and flexible operation in both base station and rover applications.

The Trimble SPS850 Receiver supports Global Positioning System (GPS) modernization through support of L2C code, L5 GPS carrier signal, and GLONASS protecting your investment well into the future. The new signals will improve performance in tough satellite coverage environments (deep cuttings, mines, trenches, landfill sites and around tall buildings) and at longer ranges from the base station.

Modularity provides the ability to choose the appropriate GPS antenna for the application, Zephyr Geodetic Model 2 at the base station and the Zephyr Model 2 for the mobile units. The GPS and radio antennas can be mounted high in permanent and semi-permanent base station applications so that they are clear from obstructions and provide maximum radio coverage, while the receiver is locked in a secure environment safe from theft and environmental conditions. The choice of radio antennas allows the customer to either attach it to the receiver itself for mobile base station and rover applications, or use a high gain or directional antenna for maximum range on large job sites.

### Standard System Features

- Integrated GPS receiver and radio

- Internal 450 or 900 MHz radio with Transmit/Receive capability

- 72-channel L1/L2/L2C/L5/GLONASS GPS receiver

- OmniSTAR XP and HP service capable

- WAAS, EGNOS & MSAS Satellite Based Augmentation (SBAS) compatible

**Trimble Construction Division, 5475 Kellenburger Road, Dayton, OH 45424, USA**

- Tough housing

- IP67 environmental rating

- -40 °C to +65 °C (-40 °F to +149 °F) operating temperature range

- 9V to 30V DC input power range with over-voltage protection

- Long life integrated battery. >10 hrs operation as a base station and >12 hrs as a rover with internal Transmit/Receive radio. (New battery operating at room temperature.)

- Integrated display and keypad for system configuration without a controller

- Integrated Bluetooth® for cable free configuration with a controller or Bluetooth enabled radio

- External GPS antenna choice for base station or rover operation

- Rubber duck antenna, or attach a high gain radio antenna for maximum coverage

- Small, lightweight design – 1.65 kg (3.64 lbs) (receiver with internal radio and battery) 4 kg (8.82 lbs) complete system weight (Rover including controller and rod)

- Permanent or semi-permanent base station, or mobile base station versatility

- ATV, belt, rod, supervisor's vehicle or marine vessel mounting options for rover applications

- Capable of all site measurement and stakeout operations within radio or cellular coverage

- Capable of rover operation within a VRS (Virtual Reference Station) network

- Easy-to-use menu system for fast configuration and status checking

- Autobase for rapid and automated repeated daily base station setups

- Supports IP so that it can be configured and checked remotely over the Internet via an Ethernet port

- One base station receiver can broadcast corrections via multiple radio links. For example, broadcast corrections via an internal 450 MHz radio, as well as an external 900 MHz radio from the same base station receiver

### SPS850 Extreme Receiver Features

Base Station

- Provides unrestricted operational range for rovers and grade control systems

- Base station and rover operation in a single receiver

- Integrated Transmit/Receive radio

- Integrated Ethernet and IP capability facilitates base station and receiver configuration over the Internet or via Ethernet connection on a computer network

- Web-based User Interface allows for remote configuration or troubleshooting

Rover

- 5/10/20 Hz measurement update rate

- Unrestricted rover operation range from a base station

- Operates within a VRS network for base station-free rover capability

- Operates with OmniSTAR HP or XP services for base station free rover capability with <30cm (1 foot) accuracy

- Operates as an SBAS rover when coverage is available

- Ideal for contractors operating mid-to-large-size projects with machine control

## Specifications

| General Characteristics | Specifications |
| --- | --- |
| Keyboard and display | VFD display 16 characters by 2 rows |
| | On / Off key for one button startup with Autobase |
| | Escape and Enter key for menu navigation |
| | 4 arrow keys (up, down, left, right) for option scrolls and data entry |
| Receiver type | Modular GPS receiver |
| Antenna type Base Station Rover OmniSTAR Rover | Zephyr Geodetic Model 2 Zephyr Model 2 Z+ Antenna Also supports legacy antennas Zephyr, Zephyr Geodetic, Micro-centered, Choke ring, Rugged micro-centered for GPS L1/L2 operation only. |

| Physical characteristics | Specifications |
| --- | --- |
| Dimensions (L x W x D) | 24cm (9.4 in) x 12cm (4.7 in) x 5cm (1.9 in) including connectors |
| Weight | 1.65 kg (3.64  lb) receiver with internal battery and radio 1.55 kg (3.42 lbs) receiver with internal battery and no radio |
| Temperature[4] Operating Storage | -40 °C to +65 °C (-40 °F to +149 °F) -40 °C to +80 °C (-40 °F to +176 °F) |
| Humidity | 100%, condensing |
| Waterproof | IP67 for submersion to depth of 1 m (3.28 ft), dustproof |
| Shock and vibration Shock - non operating Shock – operating Vibration | Tested and meets the following environmental standards: Designed to survive a 2m (6.6 ft) pole drop onto concrete MIL-STD-810F, Fig.514.5C-17 To 40 G, 10 msec, saw-tooth MIL-STD-810F, FIG.514.5C-17 |

| Performance characteristics | Specifications |
|---|---|
| Measurements | Advanced Trimble Maxwell 5 Custom GPS chip |
| | Trimble R-Track ™ technology for tracking the new L2C Civil Signal GLONASS, L5 Signal for GPS modernization |
| | High-precision multiple correlator for L1, L2 and L5 pseudo-range measurements |
| | Unfiltered, unsmoothed pseudo-range measurements data for low noise, low multi-path error, low time domain correlation and high dynamic response |
| | Very low noise L1, L2 and L5 carrier phase measurements with <1mm precision in a 1 Hz bandwidth |
| | L1, L2 and L5 Signal-to-Noise ratios reported in dB-Hz |
| | Proven Trimble low elevation tracking technology |
| | 72 Channels L1 C/A Code, L2C, L5C, L1/L2/L5 GLONASS Full Cycle Carrier |
| | WAAS / EGNOS / MSAS |
| Code differential GPS positioning[1] | |
|     Horizontal accuracy | ±(0.25m + 1 ppm) RMS, ± (9.84 in + 1 ppm) RMS |
|     Vertical accuracy | ±(0.50m + 1 ppm) RMS, ± (19.68 in + 1 ppm) RMS |
| WAAS / EGNOS / MSAS[2] | |
|     Horizontal accuracy | Typically <1 m (3.28 ft) |
|     Vertical accuracy | Typically <5 m (16.40 ft) |
| OmniSTAR Positioning | |
|     XP Service Accuracy | Horizontal 20 cm (7.87 in), Vertical 30 cm (11.80 in) |
|     HP Service Accuracy | Horizontal 10 cm (3.93 in), Vertical 15 cm (5.90 in) |
| Real Time Kinematic (RTK) positioning[1] | |
|     Horizontal | ±(10 mm + 1 ppm) RMS, ± (0.38 in +1 ppm) RMS |
|     Vertical | ±(20 mm + 1 ppm) RMS, ± (0.78 in +1 ppm) RMS |
| Initialization time | |
| Regular RTK operation with base station | Single/Multi-base minimum 10 sec + 0.5 times baseline length in km, <30 km |
| RTK operation with Scalable GPS infrastructure | <30 seconds typical anywhere within coverage area |
| Initialization reliability[3] | Typically >99.9% |

| Electrical characteristics | Specifications |
|---|---|
| Power | |
|     Internal | Integrated internal battery 7.4V, 7800 mAh, Li-Ion |
| | Internal battery operates as a UPS in the event of power source outage |
| | Internal battery will charge from external power source when input voltage is >15V |
| | Integrated charging circuitry |
|     External | Power input on Lemo 7 pin 0 shell Lemo is optimized for lead acid batteries with a cut off threshold of 10.5V |
| | Power input on the 26 pin DSub connector is optimized for Trimble Li-Ion battery input (PN 49400) with a cut off threshold of 9V |
| | Power source (Internal / External) is hot swap capable in the event of power source removal or cut off |
| | 9V to 30V DC external power input with over-voltage protection |
| | Receiver will automatically power on when connected to external power of 15V or greater. |
| Power consumption | 6.3w, in RTK rover mode with internal receive radio |
| | 8.5w, in RTK Base mode with internal transmit radio |
| Rover operation times on internal battery | |
|     450 MHz 2.0W systems | 12 hrs; varies with temperature |
|     900 MHz 1.0W systems | 12 hrs; varies with temperature |
| Base station operation times on internal battery | |
|     External radio | 16 hrs; varies with temperature |
|     450 MHz 0.5W systems* | 10 hrs; varies with temperature |
|     900 MHz 1.0W systems | 12 hrs; varies with temperature |
| *Users who purchase the 2.0w upgrade will experience battery degradation compared to the results listed here for a .5w solution. | |
| Certification | Class B Part 15, 22, 24 FCC certification |
| | Canadian FCC |
| | CE mark approval |
| | C-tick approval |
| | UN ST/SG/AC.10.11/Rev. 3, Amend. 1 (Li-Ion Battery) |
| | UN ST/SG/AC. 10/27/Add. 2 (Li-Ion Battery) |
| | UN T1 – T8 (Li-Ion Battery) |
| | 49 CFR Sections 100-185 (Li-Ion Battery) |
| | WEEE |

| Communications Characteristics | Specifications |
|---|---|
| Communications | |
| Port 1 (7-pin 0S Lemo) | 3-wire RS-232 CAN |
| Port 2 (DSub 26-pin) | Full RS-232 (Via multi-port adapter) |
| | 3-wire RS-232 CAN |
| | USB (On the Go) (Via multi-port adapter) |
| | Ethernet (Via multi-port adapter) |
| Bluetooth | Fully integrated, fully sealed 2.4 GHz Bluetooth[5] |
| Integrated radios | Fully integrated, fully sealed internal 450 MHz, TX, RX or TXRX |
| | Fully integrated, fully sealed internal 900 MHz, TX, RX or TXRX |
| Channel spacing (450MHz) | 12.5 or 25KHz spacing available |
| | Dealer Changeable with TX, TX/RX |
| | End user settable with RX only |
| Frequency approvals (900MHz) | USA (-10), Australia (-20), New Zealand (-30) |
| 450MHz Transmitter radio power output | 0.5w / 2.0w |
| 900MHz Transmitter radio power output | 1.0w (30 dBm) |
| External GSM / GPRS, cell phone support | Supported for direct dial and internet based VRS correction streams |
| | Cell phone or GSM/GPRS modem inside TSC2 controller |
| Receiver position update rate | 2 Hz, 5 Hz, 10 Hz and 20Hz positioning |
| Data Input and Output | CMR, CMR+, RTCM V2.0, RTCM 2.1, RTCM 2.3, RTCM 3.0 |
| Outputs | NMEA, GSOF and RT17 |
| Carrier | Supports BINEX and smoothed carrier |

| Receiver Options | Specifications |
|---|---|
| Internal Data Logging Option | Provides approximately 27Mb of internal memory for static data measurements |

| 450 MHz integrated radio capabilities | Base Station Receiver | Rover Receiver |
|---|---|---|
| SPS850 Extreme | Transmit / Receive | Transmit / Receive |

| 900 MHz integrated radio capabilities | Base Station Receiver | Rover Receiver |
|---|---|---|
| SPS850 Extreme | Transmit / Receive | Transmit / Receive |

### Base/Rover operations capability

| Receiver | Specifications |
|---|---|
| SPS850 Extreme | Base and Rover |

### Measured vector baseline length (Rover operational range from base station)

| Receiver | Specifications |
|---|---|
| SPS850 Extreme | Unrestricted (limited to radio or cellular coverage only). Typically 1.8 – 3.0 miles (3-5km) without repeater radio. |

### Rover operation within a VRS network using cellular phone dial up

| Receiver | Specifications |
|---|---|
| SPS850 Extreme | Enabled |

1. Accuracy and reliability may be subject to anomalies such as multipath, obstructions, satellite geometry and atmospheric conditions. Always follow recommended practices
2. Depends on WAAS / EGNOS / MSAS system performance
3. May be affected by atmospheric conditions, signal multipath and satellite geometry. Initialization reliability is continuously monitored to ensure highest quality
4. Receiver will operate normally to -40°C. Bluetooth module and internal batteries are rated to -20°C
5. Bluetooth type approvals are country-specific. Contact your local Trimble office or representative for more information

*Specifications are subject to change without notice.*