



Trimble R9s

GNSS RECEIVER

Scalable GNSS Modularity

The Trimble® R9s receiver is a GNSS receiver designed to provide Survey professionals with maximum features and flexibility. The Trimble technologies provided in the Trimble R9s receiver are a unique and comprehensive combination.

Trimble CenterPoint® RTX, Trimble xFill® and Trimble 360 technologies are integrated into this receiver system to provide Surveyors with an outstanding option for their modular requirements.

Options and Upgrades

The Trimble R9s receiver platform allows you to purchase the options you want, when you want them. Whether you just need a simple receiver for post processing, a base receiver for transmitting RTK corrections, rover for mobile positioning, or a full base and rover capability, the Trimble R9s is scalable to meet your needs. You can also upgrade at anytime which means your technology investment can grow as your needs do.

Trimble CenterPoint RTX

Trimble CenterPoint RTX delivers RTK level precision anywhere in the world without the use of a local base station or Trimble VRS Now™ correction service. Survey using satellite delivered, CenterPoint RTX corrections in areas where terrestrial based corrections are not available. When surveying over a great distance in a remote area, such as a pipeline or utility right of way, CenterPoint RTX eliminates the need to continuously move a base station or maintain connection to cell coverage.

Trimble xFill

Leveraging a worldwide network of Trimble GNSS reference stations and satellite datalinks, Trimble xFill seamlessly fills in for gaps in your RTK or VRS connection stream. In combination with a CenterPoint RTX subscription, survey level precisions are maintained beyond five minutes.

Trimble 360 Receiver

Powerful Trimble 360 receiver technology in the Trimble R9s receiver supports signals from all existing and planned GNSS constellations and augmentation systems. With two integrated Trimble Maxwell™ 6 chips, the Trimble R9s offers an unparalleled 440 GNSS channels. Trimble delivers business confidence with a sound GNSS investment for today and long into the future.

Smart for Many Applications

The Trimble R9s receiver's compact form factor, low power consumption and powerful feature set make for an ideal combination supporting a wide range of high-accuracy positioning applications, including:

- ▶ RTK and RTX rover
- ▶ Mobile field base station
- ▶ Post Processed data collection

The familiar Trimble web user interface provides full receiver status, configuration, data access, as well as a variety of security levels and access controls.

For simple hands-on configuration, the Trimble R9s receiver offers a seven-button, two line display and status information so that performing in-field configuration is practically effortless. Best of all, no handhelds are required to get datalogging started.

The Trimble R9s is available with an internal radio or with no radio. The radio model includes an internal UHF radio for transmitting and receiving RTK corrections. The no radio model can use a high power external radio for transmitting RTK corrections.

The Trimble R9s integrated lithium-ion battery can provide up to 15 hours of continuous power, easily spanning one days work. With stringent environmental specifications, the Trimble R9s is fully rugged to IP67 for dust and water and meets MIL-STD-810F standards for shock, vibration, humidity and temperature, to keep working even in harsh conditions.

Key Features

- ▶ Advanced satellite tracking with Trimble 360 receiver technology
- ▶ Cutting-edge Trimble HD-GNSS processing engine
- ▶ Convenient front panel display and configuration
- ▶ Bluetooth®, Ethernet, serial and USB support
- ▶ Data logging internally and to external drive
- ▶ Multiple data file formats
- ▶ Trimble CenterPoint RTX provides RTK level precision anywhere without the need for a base station or VRS network
- ▶ Trimble xFill technology provides seamless RTK coverage during connection outages



Trimble R9s GNSS RECEIVER

SATELLITE TRACKING

- Two advanced Trimble Maxwell 6 GNSS chipsets for a total of 440 channels
- Measure points sooner and faster with Trimble HD-GNSS technology
- Trimble EVEREST™ multipath signal rejection
- Trimble 360 receiver technology
- Very low noise GNSS carrier phase measurements with <1 mm precision in a 1 Hz bandwidth
- Signal-to-noise ratios reported in dB-Hz
- Proven Trimble low elevation tracking technology
- Satellite signals tracked simultaneously:
 - GPS: L1 C/A, L2C, L2E, L5
 - GLONASS: L1C/A, L1P, L2C/A, L2P, L3
 - Galileo: E1, E5A, E5B, E5 AltBOC
 - BeiDou: B1, B2
- CenterPoint RTX
- QZSS, WAAS, EGNOS, GAGAN, MSAS
- Positioning Rates: 1 Hz, 2 Hz, 5 Hz, 10 Hz, and 20 Hz

POSITIONING PERFORMANCE¹

Code Differential GNSS Positioning
 Horizontal 0.25 m + 1 ppm RMS
 Vertical 0.50 m + 1 ppm RMS
 SBAS differential positioning accuracy² typically <5 m 3DRMS

Static GNSS surveying
High Accuracy Static
 Horizontal 3 mm + 0.1 ppm RMS
 Vertical 3.5 mm + 0.4 ppm RMS
Static and Fast Static
 Horizontal 3 mm + 0.5 ppm RMS
 Vertical 5 mm + 0.5 ppm RMS

Real Time Kinematic surveying
Single Baseline <30 km
 Horizontal 8 mm + 1 ppm RMS
 Vertical 15 mm + 1 ppm RMS
Network RTK³
 Horizontal 8 mm + 0.5 ppm RMS
 Vertical 15 mm + 0.5 ppm RMS
 RTK start-up time for specified precisions⁴ 2 to 8 seconds

TRIMBLE RTX™ TECHNOLOGY (SATELLITE AND CELLULAR/INTERNET (IP))

CenterPoint RTX⁵
 Horizontal 2 cm RMS
 Vertical 5 cm RMS
 RTX convergence time for specified precisions - Worldwide < 15 min
 RTX QuickStart convergence time for specified precisions < 1 min
 RTX convergence time for specified precisions in select regions (Trimble RTX Fast Regions) < 1 min

Trimble xFill⁶
 Horizontal RTK⁷ + 10 mm/minute RMS
 Vertical RTK⁷ + 20 mm/minute RMS

1 Precision and reliability may be subject to anomalies due to multipath, obstructions, satellite geometry, and atmospheric conditions. The specifications stated recommend the use of stable mounts in an open sky view, EMI and multipath clean environment, optimal GNSS constellation configurations, along with the use of survey practices that are generally accepted for performing the highest-order surveys for the applicable application including occupation times appropriate for baseline length. Baselines longer than 30 km require precise ephemeris and occupations up to 24 hours may be required to achieve the high accuracy static specification.
 2 Depends on WAAS/EGNOS system performance.
 3 Network RTK PPM values are referenced to the closest physical base station.
 4 May be affected by atmospheric conditions, signal multipath, obstructions and satellite geometry. Initialization reliability is continuously monitored to ensure highest quality.
 5 RMS performance based on repeatable in field measurements. Achievable accuracy and initialization time may vary based on type and capability of receiver and antenna, user's geographic location and atmospheric activity, scintillation levels, GNSS constellation health and availability and level of multipath including obstructions such as large trees and buildings.
 6 Accuracies are dependent on GNSS satellite availability. xFill positioning without a Trimble CenterPoint RTX subscription ends after 5 minutes of radio downtime. xFill positioning with a CenterPoint RTX subscription will continue beyond 5 minutes providing the Trimble RTX solution has converged, with typical precisions not exceeding 6 cm horizontal, 14 cm vertical or 3 cm horizontal, 7 cm vertical in Trimble RTX Fast regions. xFill is not available in all regions, check with your local sales representative for more information.
 7 RTK refers to the last reported precision before the correction source was lost and xFill started.
 8 The internal battery will operate from -10° C to +55° C. The internal battery charger will operate from 0° C to +45° C. All temperatures listed are ambient.
 9 Bluetooth type approvals are country specific. Contact your Trimble distribution partner for more information.

HARDWARE

Physical
 Keyboard and display Vacuum fluorescent display 16 characters by 2 rows. Dimmable. On/Off key for one-button startup
 Dimensions (L x W x D) 24 cm x 12 cm x 5 cm
 Weight 1.65 kg receiver with internal battery and radio
 1.55 kg receiver with internal battery and no radio

ENVIRONMENTAL

Operating⁸ -40 °C to +65 °C
 Storage -40 °C to +80 °C
 Humidity MIL-STD 810F, Method 507.4
 Waterproof IP67 for submersion to depth of 1 m, dustproof
 Pole drop Designed to survive a 1 m pole drop onto a hard surface

ELECTRICAL

Internal Integrated internal battery 7.2 V, 7800 mA-hr, Lithium-ion
 External Power input on 7-pin 0-shell Lemo connector is optimized for lead acid batteries with a cut-off threshold of 11.5 V
 Power input on the 26-pin D-sub connector is optimized for Trimble Lithium-ion battery input with a cut-off threshold of 10.5 V
 Power consumption 6.0 W in rover mode with internal receive radio
 8.0 W in base mode with internal transmit radio

Operation Time on Internal Battery

Rover 13 hours; varies with temperature
 Base station
 450 MHz systems Approximately 11 hours; varies with temperature⁹

INPUT/OUTPUT FORMATS

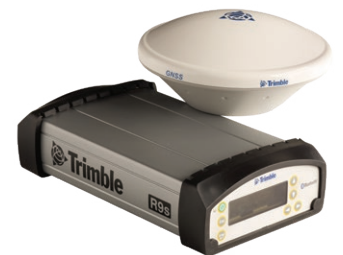
- Correction Formats:
 - CMR, CMR+, CMRx, RTCM 2.1, RTCM 2.2, RTCM 2.3, RTCM 3.0, RTCM 3.1, RTCM 3.2
- Observables:
 - RT17, RT27, RTCM 3.x, BINEX
- Position/Status I/O:
 - NMEA-0183 v2.30, GSOFF
- 1 PPS output

COMMUNICATION AND DATA STORAGE

Lemo (Serial) 7-pin 0S Lemo, Serial 1, 3-wire RS-232
 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
 Ethernet Through a multi-port adaptor
 Bluetooth wireless technology⁹ Fully-integrated, fully-sealed 2.4 GHz Bluetooth module
 Integrated radios (optional) Fully-integrated, fully-sealed internal 450 MHz (UHF) Tx/Rx
 External GSM/GPRS, cell phone support For Internet-based correction streams
 Receiver position update rate 1 Hz, 2 Hz, 5 Hz, 10 Hz, and 20 Hz positioning
 Capacity 52 MB
 External Storage USB flash drive or external hard drive

CERTIFICATIONS

IEC 60950-1 (Electrical Safety);
 FCC OET Bulletin 65 (RF Exposure Safety); FCC Part 15.105 (Class B), Part 15.247, Part 90; PTCRB (AT&T); Bluetooth SIG; IC ES-003 (Class B); Radio Equipment Directive 2014/53/EU, RoHS, WEEE; Australia & New Zealand RCM; Japan Radio and Telecom MIC



Specifications subject to change without notice.

Contact your local Trimble Authorized Distribution Partner for more information

NORTH AMERICA
 Trimble Inc.
 10368 Westmoor Dr
 Westminster CO 80021
 USA

EUROPE
 Trimble Germany GmbH
 Am Prime Parc 11
 65479 Raunheim
 GERMANY

ASIA-PACIFIC
 Trimble Navigation
 Singapore PTE Limited
 3 HarbourFront Place
 #13-02 HarbourFront Tower Two
 Singapore 099254
 SINGAPORE

