

Trimble R780

GNSS SYSTEM

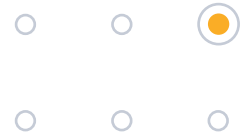
Highly accurate GNSS receiver
built to handle the toughest
survey environments.



Key features

- Configurable receiver, scalable for future requirements.
- Available in base & rover, rover only, or base only configurations.
- Trimble® Inertial Platform™ technology for magnetically immune IMU-based tilt compensation.
- Trimble ProPoint™ GNSS positioning engine for improved accuracy and productivity in challenging GNSS conditions.
- Trimble Maxwell™ 7 GNSS ASIC.
- 9 GB internal memory.
- Trimble xFill® correction outage technology.
- Supports Trimble CenterPoint® RTX corrections for RTK level accuracy worldwide via satellite/IP.
- Military-grade ultra-rugged design, IP68 rating.
- Optimized for Trimble Access™ field software.

Find out more at:
geospatial.trimble.com/R780



PERFORMANCE SPECIFICATIONS

GNSS TECHNOLOGY

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|--|
| Constellation agnostic, flexible signal tracking, improved positioning in challenging environments ¹ and inertial measurement integration with Trimble ProPoint GNSS technology |
| Increased measurement and stakeout productivity and traceability with Trimble TIP™ technology IMU-based tilt compensation |
| Trimble RTX worldwide corrections |
| Advanced Trimble Maxwell 7 technology |
| Trimble EVEREST Plus™ multipath signal rejection |
| Spectrum Analyzer to troubleshoot GNSS jamming |
| Anti-spoofing capabilities |
| Japanese LTE Filtering below 1510 MHz allows antennas to be used 100 m away from Japanese LTE cell tower |
| Iridium Filtering above 1616 MHz allows the antenna to be used 20 m away from Iridium transfer |

SATELLITE TRACKING

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|--|
| GPS: L1C, L1 C/A, L2E (L2P), L2C, L5 |
| GLONASS: L1C/A, L1P, L2C/A, L2P, L3 |
| Galileo: E1, E5A, E5B and E5AltBOC, E6 ² |
| BeiDou: B1, B2, B3, B1C, B2A |
| QZSS: L1 C/A, L1C, L1S, L2C, L5, LEX/L6 |
| IRNSS: L5 |
| SBAS: L1 C/A (EGNOS/MSAS GAGAN/SDCM), L1 C/A and L5 (WAAS) |
| L-Band: Trimble RTX |

POSITIONING PERFORMANCE³

STATIC GNSS SURVEYING

High-Precision 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 RTK⁴

| | |
|---|---------------------|
| Horizontal | 8 mm + 0.5 ppm RMS |
| Vertical | 15 mm + 0.5 ppm RMS |
| RTK start-up time for specified precisions ⁵ | 2 to 8 seconds |

TRIMBLE INERTIAL PLATFORM (TIP) TECHNOLOGY

TIP Compensated Surveying⁶

| | |
|------------|--|
| Horizontal | RTK + 8 mm + 0.5 mm/° tilt (up to 30°) RMS |
| Horizontal | RTX + 8 mm + 0.5 mm/° tilt (up to 30°) RMS |

IMU Integrity Monitor

| | |
|-----------------|----------------------------|
| Bias monitoring | Temperature, age and shock |
|-----------------|----------------------------|

TRIMBLE RTX CORRECTION SERVICES

CenterPoint RTX⁷

| | |
|---|----------|
| Horizontal | 2 cm RMS |
| Vertical | 5 cm RMS |
| RTX convergence time for specified precisions in Trimble RTX Fast regions | < 1 min |
| RTX convergence time for specified precisions in non RTX Fast regions | < 3 min |
| RTX QuickStart convergence time for specified precisions | < 5 min |

TRIMBLE xFILL⁸

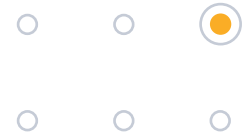
| | |
|------------|-------------------------------------|
| Horizontal | RTK ⁹ + 10 mm/minute RMS |
| Vertical | RTK ⁹ + 20 mm/minute RMS |

TRIMBLE xFILL PREMIUM⁸

| | |
|------------|----------|
| Horizontal | 3 cm RMS |
| Vertical | 7 cm RMS |

Trimble R780

GNSS System



POSITIONING PERFORMANCE³ Cont.

CODE DIFFERENTIAL GNSS POSITIONING

| | |
|--------------------|-----------------------|
| Horizontal | 0.25 m + 1 ppm RMS |
| Vertical | 0.50 m + 1 ppm RMS |
| SBAS ¹⁰ | Typically < 5 m 3DRMS |

HARDWARE

PHYSICAL

| | | |
|---------------------------|--|---|
| Dimensions (W×H) | 13.9 cm x 13 cm (5.5 in x 5.1 in) including connectors | |
| Weight | 1.55 kg (3.42 lb) receiver only including radio and battery | |
| Temperature ¹¹ | Operating | -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 (1 m submersion for 1 hour) | |
| 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 |

ELECTRICAL

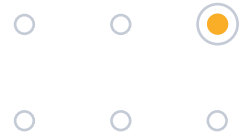
| | | |
|---|--|---|
| | Internal | Rechargeable, removable Lithium-ion battery in internal battery compartment |
| | | Internal battery operates as a UPS during an ext power source failure |
| | | Internal battery will charge from external power source as long as source can support the power drain and is more than 11.8 VDC |
| | | Integrated charging circuitry |
| | 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 12 V lead acid battery operation |
| | | Power source supply (Internal/External) is hot-swap capable in the event of power source removal or cut off |
| | | DC external power input with over-voltage protection on Port 1 (Lemo) |
| | Receiver automatically turns on when connected to external power | |
| | Power consumption | 3.2 W in rover mode with internal receive radio ¹² |
| | | 5.2 W in base mode with internal 0.5 W transmit radio |
| Operating times on internal battery ¹³ | | |
| | Rover | 5.5 hours; varies with temperature |
| | Base station | 5.5 hours; varies with temperature |
| | 450 MHz systems | Approximately 4 hours; varies with temperature |
| | 900 MHz systems | Approximately 4 hours; varies with temperature |

COMMUNICATIONS AND DATA STORAGE

| | |
|-----------------------------------|---|
| Lemo (Serial 1) | 7-pin Lemo 2-key, Power Input, USB. Optional USB to RS232 serial cable. Receiver supports RNDIS communications over USB |
| Wi-Fi | Client or Access Point. Receive or transmit corrections. Wi-Fi b/g/n |
| Bluetooth® wireless technology | Fully-integrated sealed 2.4 GHz Bluetooth module |
| 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, 2.0 W, depending on the local required licensing. |
| Frequency approvals (403–473 MHz) | Worldwide, depending on the local required licensing. |
| Positioning rates | 1 Hz, 2 Hz, 5 Hz, 10 Hz, and 20 Hz |
| Data storage | 9 GB internal data logging. Moving base and heading |
| Data format | CMR+, CMRx, RTCM 2.1, RTCM 2.3, RTCM 3.0, RTCM 3.1, RTCM 3.2 input and output 24 NMEA outputs, GSOFF, RT17, and RT27 outputs |
| Positioning rates | 1 Hz, 2 Hz, 5 Hz, 10 Hz, and 20 Hz |

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GNSS System



CERTIFICATIONS

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| FCC Part 15 Subpart B (Class B Device), Part 15.247, Part 90 |
| Canadian ICES-003 (Class B), RSS-GEN, RS-102, RSS-247 |
| IEC62368-1 2nd Edition |
| CISPR 32, EN 55032, EN55035 |
| RCM mark, AS/CISPR 32, AS/NZS 4768 |
| Japan MIC |
| CE mark, Radio Equipment Directive (RED 2014/53/EU) |
| RoHS compliance |
| WEEE compliance |

TRIMBLE PROTECTED PROTECTION PLANS

Add a Trimble Protected protection plan for worry-free ownership over and above the standard Trimble product warranty. Added enhancements include coverage for wear & tear, environmental damage, and more. Accidental damage is covered with Premium plans, available only at point-of-sale in selected regions. For details, visit trimbleprotected.com or contact a local Trimble distributor.

- 1 Challenging GNSS environments are locations where the receiver has sufficient satellite availability to achieve minimum accuracy requirements, but where the signal may be partly obstructed by and/or reflected off of trees, buildings, and other objects. Actual results may vary based on user's geographic location and atmospheric activity, scintillation levels, GNSS constellation health and availability, and level of multipath and signal occlusion.
- 2 The current capability in the receivers is based on publicly available information. As such, Trimble cannot guarantee that these receivers will be fully compatible with a future generation of Galileo satellites or signals.
- 3 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 precision static specification.
- 4 Network RTK PPM values are referenced to the closest physical base station.
- 5 May be affected by atmospheric conditions, signal multipath, obstructions and satellite geometry. Initialization reliability is continuously monitored to ensure highest quality.
- 6 TIP references the overall positioning error estimate at the tip of the surveying pole throughout the tilt compensation range. RTK refers to the estimated horizontal precision of the underlying GNSS position, which is dependent on factors that affect GNSS solution quality. The 5 mm constant error component accounts for residual misalignment between the vertical axes of the receiver and the built-in Inertial Measurement Unit (IMU) after factory calibration, assuming the receiver is mounted on a standard 2 m carbon fiber range pole which is properly calibrated and free from physical defects. The tilt-dependent error component is a function of the quality of the computed tilt azimuth, which is assumed here to be aligned using optimal GNSS conditions. For best IMU tilt compensated results, perform a pole bias adjustment.
- 7 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.
- 8 Accuracies are dependent on GNSS satellite availability. xFill positioning without an xFill Premium subscription ends after 5 minutes of radio downtime. xFill Premium will continue beyond 5 minutes providing the solution has converged, with typical precisions not exceeding 3 cm horizontal, 7 cm vertical. xFill is not available in all regions, check with your local sales representative for more information.
- 9 RTK refers to the last reported precision before the correction source was lost and xFill started.
- 10 Depends on SBAS system performance.
- 11 Receiver will operate normally to -40 °C, internal batteries are rated from -20 °C to +60 °C (ambient +50 °C).
- 12 Tracking GPS, GLONASS and SBAS satellites.
- 13 Varies with temperature and wireless data rate. When using a receiver and internal radio in the transmit mode, it is recommended that an external 6 Ah or higher battery is used.

Specifications subject to change without notice.



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