# Trimble R10

## MODEL 2 GNSS SYSTEM

## PURE, UNINTERRUPTED SURVEYING

Collect more accurate data faster and easier, no matter what the job or the environment, with the Trimble® R10 GNSS system.

### Trimble 360 Receiver

Powerful Trimble 360 receiver technology in the Trimble R10 supports signals from all existing and planned GNSS constellations and augmentation systems. With the latest and most advanced Trimble GNSS technology, the Trimble R10 offers an unparalleled 672 GNSS channels to future-proof your investment.

The new Trimble R10 also provides improved interference protection to suppress a variety of intentional and unintentional sources of interference, as well as spoofing, for optimal performance in today's increasingly crowded signal frequency spectrum.

### Trimble HD-GNSS Processing Engine

The advanced Trimble HD-GNSS processing engine provides markedly reduced convergence times as well as high position and precision reliability while reducing measurement occupation time. Transcending traditional fixed/float techniques, it provides a more accurate assessment of error estimates than traditional GNSS technology.

### Trimble SurePoint

With Trimble SurePoint™ technology, an electronic level bubble is displayed on the Trimble controller screen, allowing surveyors to maintain focus where it matters most. Full tilt compensation allows the survey pole to be tilted up to 15° when measuring, allowing the Trimble R10 to capture points that would be inaccessible to other GNSS surveying systems.

### Trimble CenterPoint RTX

Trimble CenterPoint® RTX delivers RTK level precision anywhere in the world without the use of a local base station or VRS™ network. Survey using satellite or internet delivered CenterPoint RTX correction services in areas where terrestrial based corrections are not available.

### Trimble xFill

Leveraging a worldwide network of Trimble GNSS reference stations and satellite datalinks, Trimble xFill® technology seamlessly fills in for gaps in your RTK or VRS correction stream. Maintain centimeter-level accuracy beyond 5 minutes with a CenterPoint RTX subscription.

### Smart, Versatile

The Trimble R10 is a versatile solution, loaded with smart features to support any workflow, all day long:

- Integrated cellular modem to receive VRS corrections or operate as a mobile hotspot
- Wi-Fi to connect to a laptop or smartphone to configure the receiver without a Trimble controller
- Bluetooth to connect to an Android or iOS mobile device running supported apps
- 6 GB internal memory to store raw observations
- Smart lithium-ion battery, with built-in battery status indicator
- Improved power management increases battery life and operating time in the field on average by 33%

## Key Features

- ▶ Advanced satellite tracking with Trimble 360 receiver technology and latest generation Trimble Custom Survey GNSS ASIC with 672 GNSS channels
- ▶ Improved protection against sources of interference and spoofed signals
- ▶ Support for Android and iOS platforms
- ▶ Cutting-edge Trimble HD-GNSS processing engine
- ▶ Precise position capture and full tilt compensation with Trimble SurePoint technology
- ▶ Trimble CenterPoint RTX provides RTK level precision worldwide without the need for a base station or VRS network
- ▶ Trimble xFill technology provides centimeter-level positioning during connection outages
- ▶ Sleek ergonomic design for easier handling

Trimble®

## PERFORMANCE SPECIFICATIONS

### MEASUREMENTS

| | |
|---|---|
| Measuring points sooner and faster with Trimble HD-GNSS technology | |
| Increased measurement productivity and traceability with Trimble SurePoint electronic level bubble and tilt compensation | |
| Worldwide centimeter-level positioning using Trimble CenterPoint RTX satellite or internet delivered correction services | |
| Reduced downtime due to loss of radio signal or cellular connectivity with Trimble xFill technology | |
| Advanced Trimble Custom Survey GNSS chips with 672 channels | |
| Future-proof your investment with Trimble 360 GNSS tracking | |
| Satellite signals tracked simultaneously | GPS: L1C/A, L2C, L2E, L5<br>GLONASS: L1C/A, L1P, L2C/A, L2P, L3<br>SBAS: L1C/A, L5 (For SBAS satellites that support L5)<br>Galileo: E1, E5A, E5B, E5 AltBOC, E6[1]<br>BeiDou: B1, B2, B3<br>QZSS: L1C/A, L1-SAIF, L1C, L2C, L5<br>NavIC (IRNSS): L5 |
| CenterPoint RTX, OmniSTAR® HP, XP, G2, VBS correction services | |
| WAAS, EGNOS, GAGAN, MSAS | |
| Reliable tracking in challenging environments with advanced Low Noise Amplifier (LNA) with 50 dB signal gain to reduce signal tracking effects caused by high power out-of-band transmitters | |
| Additional iridium filtering above 1616 MHz allows antenna to be used as close as 20 m of iridium transmitter | |
| Additional Japanese filtering below 1510 MHz allows antenna to be used as close as 100 m of Japanese LTE cell tower | |
| Digital Signal Processor (DSP) techniques to detect and recover from spoofed GNSS signals | |
| Advanced Receiver Autonomous Integrity Monitoring (RAIM) algorithm to detect and reject problem satellite measurements to improve position quality | |
| Improved protection from erroneous ephemeris data | |
| Positioning Rates | 1 Hz, 2 Hz, 5 Hz, 10 Hz, and 20 Hz |

## POSITIONING PERFORMANCE[2]

### CODE DIFFERENTIAL GNSS POSITIONING

| | |
|---|---|
| Horizontal | 0.25 m + 1 ppm RMS |
| Vertical | 0.50 m + 1 ppm RMS |
| SBAS differential positioning accuracy[3] | typically <5 m 3DRMS |

### 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 RTK[4]**

| | |
|---|---|
| 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 RTX™ TECHNOLOGY (SATELLITE AND CELLULAR/INTERNET (IP))

**CenterPoint RTX[6]**

| | |
|---|---|
| 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 XFILL[7]

| | |
|---|---|
| Horizontal | RTK[8] + 10 mm/minute RMS |
| Vertical | RTK[8] + 20 mm/minute RMS |

## HARDWARE

### PHYSICAL

| | |
|---|---|
| Dimensions (W×H) | 11.9 cm x 13.6 cm (4.6 in x 5.4 in) |
| Weight | 1.12 kg (2.49 lb) with internal battery, internal radio with UHF antenna, 3.57 kg (7.86 lb) items above plus range pole, controller & bracket |

### Temperature[9]

| | | |
|---|---|---|
| | 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 | | IP67 dustproof, protected from temporary immersion to depth of 1 m (3.28 ft) |

### Shock and vibration (Tested and meets the following environmental standards)

| | | |
|---|---|---|
| | Shock | Non-operating: Designed to survive a 2 m (6.6 ft) pole drop onto concrete. Operating: to 40 G, 10 msec, sawtooth |
| | Vibration | MIL-STD-810F, FIG.514.5C-1 |

### ELECTRICAL

| | |
|---|---|
| | Power 11 to 24 V DC external power input with over-voltage protection on Port 1 and Port 2 (7-pin Lemo) |
| | Rechargeable, removable 7.4 V, 3.7 Ah Lithium-ion smart battery with LED status indicators |
| | Power consumption is 4.2 W in RTK rover mode with internal radio[10] |

### Operating times on internal battery[11]

| | | |
|---|---|---|
| | 450 MHz receive only option | 6.5 hours |
| | 450 MHz receive/transmit option (0.5 W) | 6.0 hours |
| | 450 MHz receive/transmit option (2.0 W) | 5.5 hours |
| | Cellular receive option | 6.5 hours |

## COMMUNICATIONS AND DATA STORAGE

| | | |
|---|---|---|
| Serial | 3-wire serial (7-pin Lemo) | |
| USB v2.0 | Supports data download and high speed communications | |
| Radio modem | Fully Integrated, sealed 450 MHz wide band receiver/transmitter with frequency range of 403 MHz to 473 MHz, support of Trimble, Pacific Crest, and SATEL radio protocols: | |
| | Transmit power | 2 W |
| | Range | 3–5 km typical / 10 km optimal[12] |
| Cellular | Integrated, 3.5 G modem, HSDPA 7.2 Mbps (download), GPRS multi-slot class 12, EDGE multi-slot class 12, Penta-band UMTS/HSDPA (WCDMA/FDD) 800/850/900/1900/2100 MHz, Quad-band EGSM 850/900/1800/1900 MHz, GSM CSD, 3GPP LTE | |
| Bluetooth | Fully integrated, fully sealed 2.4 GHz communications port (Bluetooth)[13] | |
| Wi-Fi | 802.11 b,g, access point and client mode, WPA/WPA2/WEP64/WEP128 encryption | |
| USB v2.0 | Supports data download and high speed communications | |
| External communication devices for corrections supported on | Serial, USB, TCP/IP and Bluetooth ports | |
| Data storage | 6 GB internal memory; over ten years of raw observables (approx. 1.4 MB /day), based on recording every 15 seconds from an average of 14 satellites | |
| 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, GSOF, RT17 and RT27 outputs | |

### WEBUI

| | |
|---|---|
| | Offers simple configuration, operation, status, and data transfer |
| | Accessible via Wi-Fi, Serial, USB, and Bluetooth |

### SUPPORTED CONTROLLERS

| | |
|---|---|
| | Trimble TSC7, Trimble T10, Trimble TSC3, Trimble Slate, Trimble CU, Trimble Tablet Rugged PC, Android and iOS devices running supported apps |

## CERTIFICATIONS

| | |
|---|---|
| | FCC Part 15 (Class B device), 24, 32; CE Mark; RCM; PTCRB; BT SIG |

# Trimble R10 MODEL 2 GNSS SYSTEM

1   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.
2   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.
3   Depends on WAAS/EGNOS system performance.
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   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.
7   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.
8   RTK refers to the last reported precision before the correction source was lost and xFill started.
9   Receiver will operate normally to −40 °C, internal batteries are rated to −20 °C.
10  Tracking GPS, GLONASS and SBAS satellites.
11  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.
12  Varies with terrain and operating conditions.
13  Bluetooth type approvals are country specific.

Specifications subject to change without notice.

Contact your local Trimble Authorized Distribution Partner for more information