

### KEY FEATURES

Proven GNSS technology from Trimble

440 channels for unmatched GNSS tracking performance

Bluetooth®, Ethernet, Serial and USB support

Position Monitoring and Alerting functionality notifies of any change in antenna position

Large capacity internal memory plus external USB device logging capability

Convenient front panel display and configuration

Power over Ethernet (PoE) technology

Eight independent logging sessions

Multiple data file formats

Integrated battery which can act as a primary power source or as an uninterrupted power supply (UPS) backup

Powerful remote configuration and access



The Trimble® NetR9™ Global Navigation Satellite System (GNSS) reference receiver series consists of full-feature, top-of-the-line receivers designed to provide network operators with maximum features and functionality from a single receiver platform.

Using the latest generation of Trimble 360 receiver technology in combination with two Trimble Maxwell™ 6 chipsets, the Trimble NetR9 reference receiver offers an industry-leading 440 channels for unmatched GNSS multi-constellation tracking performance. With the world's GNSS in constant development, the Trimble NetR9 reference receiver provides the operator with the assurance that it has the capability to grow with the industry, both today, and well into the future.

The Trimble NetR9 reference receiver supports a wide range of satellite signals. Currently, the NetR9 platform is capable of tracking signals from GPS, GLONASS, Galileo<sup>1</sup>, Compass, and QZSS constellations. With 440 channels, the NetR9 has the capacity to accommodate additional signals as they may become available, eliminating the need to replace hardware to keep pace with technology<sup>2</sup>.

The Trimble NetR9 reference receiver supports the new CMRx communications protocol, which provides unprecedented GNSS correction compression for optimized bandwidth and low latency data transmission. Combined, this results in greater data throughput at a lower operating cost.

The Trimble NetR9 reference receiver's compact form factor, low power consumption and powerful network capabilities make for an ideal combination supporting a wide range of high-accuracy positioning applications. A few specific examples include:

- Trimble VRS™ network receiver
- Mobile field base station
- Academic research
- Continuously Operating Reference Station (CORS)
- Field campaign receiver for post-processing applications
- Use in DGPS MSK beacon systems
- Monitoring integrity of VRS networks, along with other physical infrastructure such as oil platforms, mines, dams, bridges, or other natural and man-made objects where precise deformation is crucial

The Trimble NetR9 reference receiver has eight gigabytes of physical memory built into the circuit board, providing a high level of data protection. Additionally, the use of external USB logging devices is supported providing the Trimble NetR9 reference receiver unparalleled

storage capacity and flexibility. Combined with logging of T02, RINEX, BINEX, and Google Earth formats, factored together with FTP and Email Push technology, the Trimble NetR9 achieves an uncompromised blend of functionality and efficiency.

With stringent environmental specifications and an integrated lithium-ion, the Trimble NetR9 protects to ensure no data is missed. The integrated Li-Ion battery can power the Trimble NetR9 continuously up to 15 hours, either as a primary power source or as an emergency backup source.

The Trimble NetR9 reference receiver comes with powerful built-in remote management. Utilizing Internet Protocol (IP) as the primary communications mechanism, the familiar Trimble Infrastructure web user interface provides full receiver status, configuration, firmware updates, data access, as well as a variety of security levels and access controls. Furthermore, the receiver supports Email Alerts so the operator knows exactly what is taking place at the receiver. This includes integrated position monitoring so as to always know if your antenna has moved before it is too late.

For simple hands-on configuration, the Trimble NetR9 reference 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 this job done.

Available in three configurations, including the NetR9 Ti-1 (full featured), along with the Ti-2 and Ti-3 (both fully upgradable), the NetR9 provides the most flexible receiver platform offered to date. With the NetR9 receiver platform's robust functionality, you can trust Trimble to provide the very latest technology in the GNSS industry to help position your way into the future.

1. Developed under a License of the European Union and the European Space Agency.  
2. For more information about Trimble and GNSS modernization, please visit [http://www.trimble.com/srv\\_new\\_era.shtml](http://www.trimble.com/srv_new_era.shtml).

## SATELLITE TRACKING

- Two advanced Trimble Maxwell 6 GNSS chipsets for a total of 440 channels
- Trimble EVEREST™ multipath signal rejection
- Trimble 360 receiver technology
- Trimble R-Track™ technology
- High precision multiple correlator for GNSS pseudorange measurements
- Unfiltered, unsmoothed pseudorange measurements data for low noise, low multipath error, low time domain correlation and high dynamic response
- Proprietary Receiver Autonomous Integrity Monitor (RAIM) system to detect and reject degraded signals to improve position quality.
- 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
- Current satellite signals tracked simultaneously:
  - GPS: L1 C/A, L2C, L2E (Trimble method for tracking unencrypted L2P), L5
  - GLONASS: L1 C/A and unencrypted P code, L2 C/A and unencrypted P code, L3 CDMA<sup>2</sup>
  - Galileo<sup>3</sup>: L1 CBOC, E5A, E5B & E5AltBOC
  - Compass<sup>4</sup>: B1, B2, B3
  - QZSS: L1 C/A, L1C, L1 SAIIF, L2C, L5, LEX<sup>5</sup>
  - SBAS: L1 C/A (EGNOS/MSAS), L1 C/A and L5 (WAAS),
  - L-Band: OmniSTAR VBS, HP and XP

## INPUT/OUTPUT FORMATS

- Correction Formats:
  - CMR, CMR+, CMRx, RTCM 2.1, RTCM 2.2, RTCM 2.3, RTCM 3.0, RTCM 3.1
- Observables:
  - RT17, RT27, BINEX, RTCM 3.x
- Position/Status I/O:
  - NMEA-0183 v2.30, GSOE
- Up to 50 Hz Output
- 10 MHz External Frequency Input
  - Normal input level 0 to +13 dBm
  - Maximum input level +17 dBm, ±35 V DC
  - Input impedance 50 Ohms @ 10 MHz; DC blocked
- 1 PPS Output
- Event Input
- Met/Tilt Sensor Support

## POSITIONING PERFORMANCE<sup>6</sup>

### Code Differential GNSS Positioning

Horizontal	0.25 m + 1 ppm RMS
Vertical	0.50 m + 1 ppm RMS
WAAS differential positioning accuracy <sup>7</sup>	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 & Fast Static

Horizontal	3 mm + 0.5 ppm RMS
Vertical	5 mm + 0.5 ppm RMS

### Real Time Kinematic Surveying<sup>8</sup>

#### Single Baseline <30 km

Horizontal	8 mm + 1 ppm RMS
Vertical	15 mm + 1 ppm RMS

#### Networked RTK

Horizontal	8 mm + 0.5 ppm RMS
Vertical	15 mm + 0.5 ppm RMS

Initialization time	typically <10 seconds
Initialization reliability	typically >99.9%

## COMMUNICATION

- Serial Ports
  - One D9 Male, EIA-574 RS-232/V.24 Full 9 wire serial
  - One Lemo 7 pin Oshell, 3 wire serial with power input, 1 PPS output and event input
  - One Mini B USB 5 pin; supports Device and Host mode operations
- Bluetooth<sup>9</sup>
  - Integrated 2.4 GHz Bluetooth; supports 3 simultaneous connections
- Ethernet
  - Integrated RJ45 jack
  - Full-duplex, auto-negotiate 100Base-T
  - Power over Ethernet (PoE) support with a Class 3 PoE supply
  - HTTP, HTTPS, TCP/IP, UDP, FTP, NTRIP Caster, NTRIP Server, NTRIP Client
  - Proxy server support
  - Routing table support
  - NTP Server, NTP Client support
  - UPnP and Zeroconf support
  - Email Alerts and File Push
  - Position Monitoring

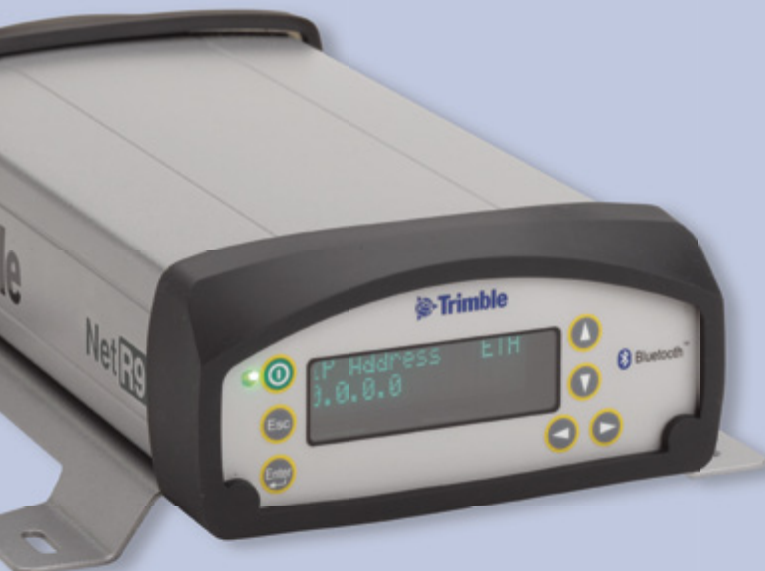
## DATA LOGGING

### Storage Capacity

Onboard memory	8 GB
External memory <sup>10</sup>	greater than 1 TB
Maximum logging rate	50 Hz
File durations	5 minutes to continuous
Storage sessions	8 concurrent independent sessions with dedicated memory pooling and ring buffers
File formats	.T02, RINEX v2.11, RINEX v3.0, BINEX, Google Earth KMZ
File naming options	multiple
Data retrieval and transfer	HTTP, FTP Server, USB, FTP Push and Email Push
Events	definable file protection on events

## PHYSICAL SPECIFICATIONS

Dimensions (L x W x H)	26.5 cm x 13.0 cm x 5.5 cm (10.43 in x 5.12 in x 2.16 in)
Weight	1.75 kg (3.85 lb)



## ENVIRONMENT

Certification	IP67 and MIL-STD 810F
Operating temperature <sup>11</sup>	-40 °C to +65 °C (-40 °F to +149 °F)
Storage temperature	-40 °C to +80 °C (-40 °F to +176 °F)
Humidity	100% condensing
Shock	Survival: Non-operating 75 g, 6 ms; Operating: to 25 g, 10 ms, sawtooth; designed to survive a 1 m drop onto hard surface
Vibration	Operating: 7.5 Hz to 350 Hz 0.015 g <sup>2</sup> /Hz, 350 Hz to 500 Hz 0.006 g <sup>2</sup> /Hz -6dB/Octave; Non-Operating: 10 Hz to 300 Hz 0.04 g <sup>2</sup> /Hz 300 Hz to 1000 Hz -6 dB/Octave
Ingress protection	IP67; waterproof for temporary immersion to a depth of 1 m (3.28 ft); dustproof

## USER INTERFACE

- **Front Panel Display**
  - 2-line x 16-character vacuum fluorescent display
  - Advanced power saving modes
  - Escape and Enter key for menu navigation
  - 4 arrow keys (up, down, left and right) for scrolling and data entry
  - Power button and indication LED
- **Web User Interface**
  - Secure
  - Allows remote configuration, data retrieval and firmware updates
- **Programmatic Interface**
  - Allows for open, non-proprietary access, control and configuration

## ANTENNA SUPPORT

Output voltage	5.0 V DC nominal
Maximum output current	150 mA
Maximum cable loss	12 dB
Recommended antennas	Trimble Zephyr Geodetic™ 2, Trimble GNSS Choke Ring, Trimble GNSS-Ti Choke Ring

## SECURITY

- Optional HTTP login
- HTTPS
- Real-time stream authentication
- Programmatic interface authentication
- NTRIP

## ELECTRICAL

- Power over Ethernet (PoE) 802.3af; requires a Class 3 PoE supply
- 9.5 V DC to 28 V DC input on Lemo port
  - User-configurable power-on voltage
  - User-configurable power-down voltage
- Integrated internal battery 7.4 V, 7800 mA-hr, Li-Ion; 15 hours of continuous operation, dependent on user settings
- Internal battery operates as a UPS in the event of power source outage
- Seamless switching between external/internal power sources
- Internal battery will charge from external power source when input voltage is >12 V DC
- Integrated charging circuitry
- Power consumption 3.8 W nominal, dependent on user settings

## REGULATORY COMPLIANCE

- RoHS
- China RoHS
- FCC Part 15.247 FCC certifications
- Class B Device FCC Part 15 and ICES-003 compliance
- RSS-310 and RSS-210 Industry Canada compliance
- CE mark compliance
- C-Tick mark compliance
- UN ST/SG/AC.10.11/Rev. 3, Amend. 1 (Li-Ion battery)
- UN ST/SG/AC.10/27/Add. 2 (Li-Ion battery)
- WEEE

- <sup>1</sup> NetR9 available in three configurations: Ti-1, Ti-2 and Ti-3. Specifications shown reflect full configuration capability. Please consult your local distributor for additional information.
- <sup>2</sup> There is no public GLONASS L3 CDMA ICD. 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 GLONASS satellites or signals.
- <sup>3</sup> Developed under a License of the European Union and the European Space Agency.
- <sup>4</sup> At the time of this publication, no public Compass ICD was available. 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 Compass satellites or signals.
- <sup>5</sup> Pilot observable.
- <sup>6</sup> Accuracy 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 hr may be required to achieve the high accuracy static specification.
- <sup>7</sup> Depends on WAAS/EGNOS system performance.
- <sup>8</sup> NetR9 limited to 1,000 m RTK baseline length. Networked RTK PPM values are referenced to the closest physical base station.
- <sup>9</sup> Bluetooth type approvals are country specific. Contact your local authorized Trimble distribution partner for more information.
- <sup>10</sup> USB device minimum recommended specification must support USB 2.0 Hi-Speed with a minimum write speed of 6 Mbps. Solid state drives recommended for optimal performance.
- <sup>11</sup> The internal battery will operate from -10 °C to +55 °C (14 °F to +131 °F). The internal battery charger will operate from 0 °C to 45 °C (32 °F to 113 °F). All temperatures listed reference the ambient temperature.



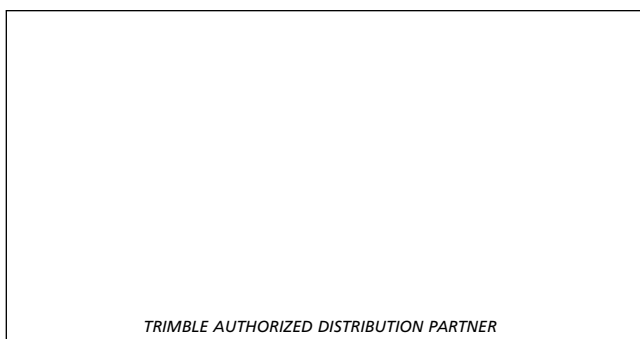
# NetR9 MODEL COMPARISON

The NetR9 reference receiver is available in three configurations, the NetR9 Ti-1 (fully featured), the NetR9 Ti-2 (fully upgradable), and the NetR9 Ti-3 (fully upgradeable). Any option which is not part of the standard Ti-x package may be upgraded at any time to enable functionality, increase memory, or increase logging rates, to a maximum equal to that of the NetR9 Ti-1 offering. The enabled options of each package are as follows:

FEATURE	NetR9 TI-3	NetR9 TI-2	NetR9 TI-1
Channels	440	440	440
Data tracking/storage rate	1 Hz	20 Hz	50 Hz
On-board storage size	0 GB	4 GB	8 GB
GPS L1/L2 signal processing	✓	✓	✓
GPS L2C signal processing	×	✓	✓
GPS L5 signal processing	×	✓	✓
GLONASS signal processing	×	✓	✓
Galileo signal processing	×	×	✓
Compass signal processing	×	×	✓
QZSS signal processing	×	×	✓
CMR/CMR+ Input	×	×	✓
CMR/CMR+ Output	×	✓	✓
CMRx Input	×	✓	✓
CMRx Output	×	✓	✓
RTCM Input	×	✓	✓
RTCM Output	×	✓	✓
Advanced RTCM Output	×	✓	✓
Event Marker	×	✓	✓
NMEA	×	✓	✓
Bluetooth	×	✓	✓
External USB Support	×	✓	✓
RTK	×	✓	✓
Integrated USB support	×	✓	✓
Programmatic Interface	×	×	✓
Position Monitoring	✓	✓	✓



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