



NetR9

GNSS REFERENCE RECEIVER SERIES

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, Galileo¹, Beidou, 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 technology².

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 TO2, 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 upgradable configurations (NetR9 Ti-1, Ti-2, and Ti-3) along with one non-upgradable configuration (NetR9 Ti-M), 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.

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
- ▶ Twelve 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
- ▶ Trimble RTX™ World Wide Correction Service ready



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.

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 CDMA²
 - Galileo³: L1 CBOC, E5A, E5B & E5AltBOC
 - Beidou⁴: B1, B2, B3
 - QZSS: L1 C/A, L1C, L1 SAIF, L2C, L5, LEX⁵
 - SBAS: L1 C/A (EGNOS/MSAS), L1 C/A and L5 (WAAS/GAGAN)
 - L-Band: OmniSTAR VBS, HP and XP
 - Trimble RTX World Wide Corrections

INPUT/OUTPUT FORMATS

- Correction Formats:
 - CMR, CMR+, CMRx, RTX, RTCM 2.1-3.2 and MSM
- Observables:
 - RT17, RT27, BINEX, RTCM 3.x
- Position/Status I/O:
 - NMEA-0183 v2.30, GSOFF
- 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 PERFORMANCE⁶

Code Differential GNSS Positioning	
Horizontal	0.25 m + 1 ppm RMS
Vertical	0.50 m + 1 ppm RMS
WAAS differential positioning accuracy⁷	
Horizontal	0.50 m RMS
Vertical	0.85 m RMS
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 Surveying⁸	
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
- Bluetooth⁹
 - 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
 - IP Filtering

DATA LOGGING

Storage Capacity	8 GB
Onboard memory	greater than 1 TB
External memory ¹⁰	50 Hz
Maximum logging rate	5 minutes to continuous
File durations	12 concurrent independent sessions with dedicated memory pooling and ring buffers
Storage sessions	multiple
File formats	T02, RINEX v2.xx, RINEX v3.xx, 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



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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 temperature¹¹ -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: 2.6 g RMS, 7.5 Hz/0.015 g²/Hz;
350 Hz/0.015 g²/Hz; 500 Hz/0.006 g²/Hz
Non-Operating: 4.3 g RMS, 10 Hz/0.04 g²/Hz;
300 Hz/0.04 g²/Hz; 1000 Hz/0.002 g²/Hz

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 3 Geodetic™,
Trimble GNSS Choke Ring, Trimble GNSS-Ti Choke Ring,
Ag25 (for use with Ti-M variant only)

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

- 1 NetR9 available in four configurations: Ti-1, Ti-2, Ti-3, and Ti-M. Specifications shown reflect full configuration capability. Please consult your local distributor for additional information.
- 2 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.
- 3 Developed under a License of the European Union and the European Space Agency.
- 4 Current Beidou capability is based on publicly available information. The hardware of this product is designed for Beidou B3 compatibility (trial version) and its firmware will be enhanced, where possible, to fully support such new signals as soon as the officially published signal interface control documentation (ICD) becomes available. As such, Trimble cannot guarantee full compatibility with future generations of Beidou satellites or signals.
- 5 Pilot observable.
- 6 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 precision 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.
- 7 Depends on WAAS/EGNOS system performance.
- 8 Networked RTK PPM values are referenced to the closest physical base station.
- 9 Bluetooth type approvals are country specific. Contact your local authorized Trimble distribution partner for more information.
- 10 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.
- 11 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.



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The NetR9 reference receiver is available in four configuration, the NetR9 Ti-1 (fully featured), the NetR9 Ti-2 and Ti-3 (fully upgradable), and the NetR9 Ti-M (not upgradable). Any option which is not part of the standard Ti-2 or Ti-3 packages 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 NetR9 Ti-M variant is intended for Monitoring applications. As such, the NetR9 Ti-M is not supported by all software packages and no upgrades are available for this configuration. The enabled options of each package are as follows:

FEATURE	NetR9 Ti-M	NetR9 Ti-3	NetR9 Ti-2	NetR9 Ti-1
Channels	440	440	440	440
Data tracking/storage rate	10 Hz	1 Hz	20 Hz	50 Hz
On-board storage size	2 GB	0 GB	4 GB	8 GB
GPS L1/L2 signal processing	√	√	√	√
GPS L2C signal processing	√	0	√	√
GPS L5 signal processing	√	0	√	√
GLONASS signal processing	√	0	√	√
Galileo signal processing	√	0	0	√
Beidou signal processing	√	0	0	√
QZSS signal processing	√	0	0	√
CMR/CMR+/CMRx Input	√	0	√	√
CMR/CMR+/CMRx Output	×	0	√	√
RTCM Input	√	0	√	√
RTCM Output	×	0	√	√
Advanced RTCM Output	×	0	√	√
Event Marker	√	0	√	√
NMEA	√	0	√	√
Bluetooth	√	0	√	√
External USB Logging	×	0	√	√
RTK	√	√	√	√
Programmatic Interface	×	0	0	√
Position Monitoring	√	√	√	√
Trimble RTX	√	0	0	0

0 = option



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