



GNSS 501 & GNSS-502 Antennas

USER GUIDE

GM-14915144

Rev 2

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The GNSS-501 and GNSS-502 are active antennas designed to receive signals from GPS, GLONASS, BeiDou and Galileo satellites as well as L-Band signals.

The GNSS-501 antenna is designed to operate in GPS L1, GLONASS L1 and L-Band frequencies. The GNSS-501 also supports Galileo E1 frequency and the BeiDou B1 frequency.

The GNSS-502 antenna is designed to operate in GPS L1/L2, GLONASS L1/L2 and L-Band frequencies. The GNSS-502 also supports the Galileo E1 and E5b frequencies as well as BeiDou B1 and B2 frequencies.

This guide provides the basic information you need to install and begin using your new antenna.

ADDITIONAL EQUIPMENT REQUIRED

The following equipment is required to set up the GNSS-501 or GNSS-502 antenna:

- Coaxial cable with a male TNC connector
- A device with an antenna input port that both receives the RF signal and provides 3.3 - 18.0 VDC to the antenna (all NovAtel GNSS receivers provide the necessary power through their antenna RF connectors)

SITE SELECTION GUIDELINES

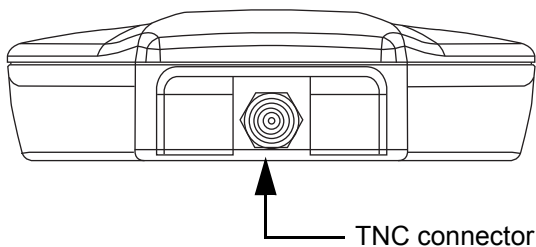
Before installing the antenna, select a site that as closely as possible meets the following conditions for optimal performance:

- An unobstructed line-of-sight from horizon to horizon and at all bearings and elevation angles
- As far as possible from reflective objects, especially those that are above the antenna and any water bodies, which can be a strong source of multipath reflections
- If obstructions and reflective surfaces are within 30 m, ensure the site is as high as possible. Otherwise, mount the antenna as close as possible to a reference ground plane, i.e., rooftop, earth, etc., if one exists.



To avoid potential adverse effects, do not locate antennas near any high sources of heat.

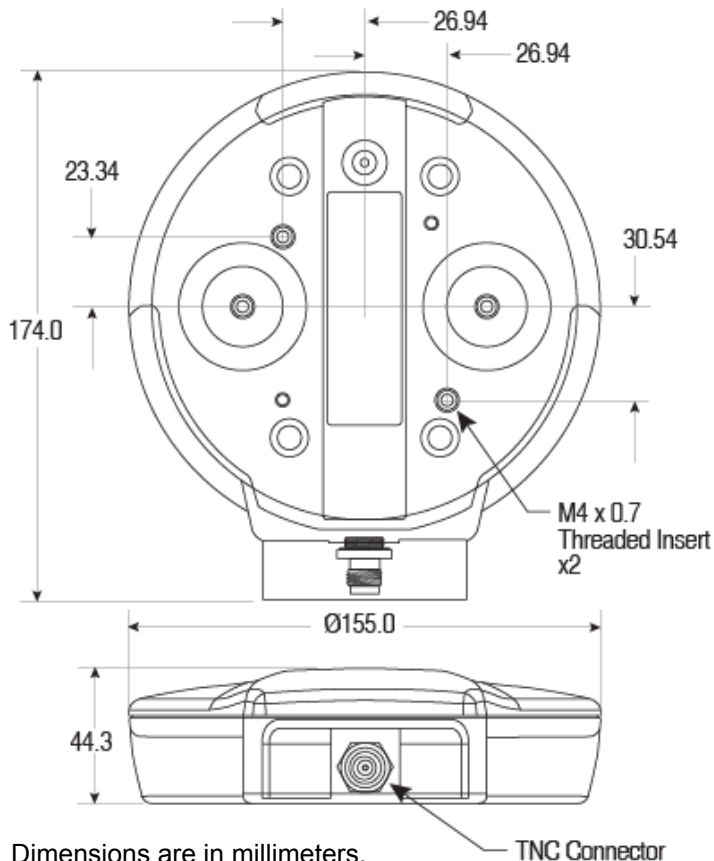
INSTALLING THE ANTENNA



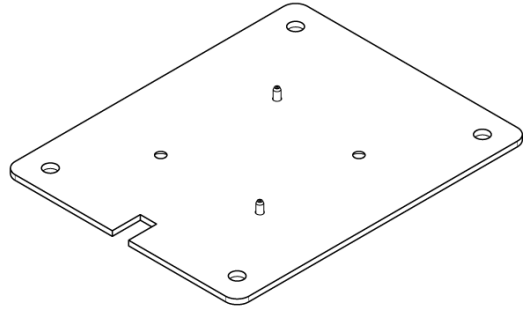
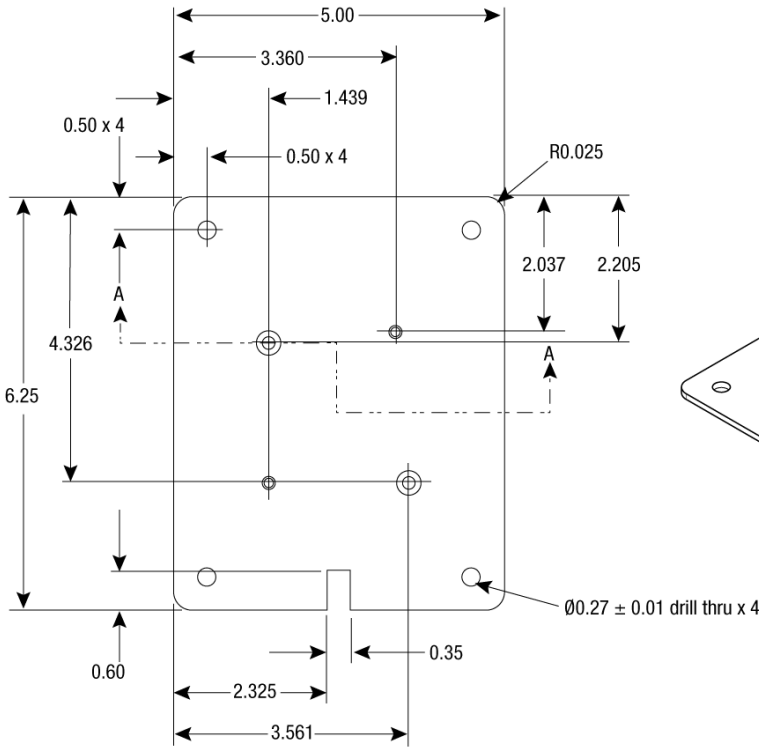
After a site has been selected, install the antenna as follows:

1. Mount the antenna on a secure, stable structure using the provided magnetic mounts. A surface mounting plate (NovAtel P/N 01018317) is also available for mounting on non-magnetic surfaces.
2. Attach the TNC connector of the coaxial cable to the antenna's TNC connector. Attach the other end of the coaxial cable to the antenna input port of the receiving device, which must provide power as detailed in the *SPECIFICATIONS* section of this guide. All NovAtel GNSS receivers provide the necessary power through their antenna RF connectors.

MECHANICAL DRAWING



MOUNTING PLATE (NOVATEL P/N 01018317)



Dimensions are in inches.



Two magnetic mounts also available on the bottom of the antennas.

⚠ The optimal screw penetration into the mounting holes is 6 mm (± 1 mm) deep. When selecting screws for mounting, ensure the screw penetration does not exceed this specification. Using excessively long screws can damage the antenna enclosure.

ANTENNA CARE

The GNSS-501 and GNSS-502 are designed to withstand the elements, including rain, snow, and dust. However, to ensure your antenna performs optimally, keep the radome (the top surface of the antenna) clean and brush off any ice and snow.

SPECIFICATIONS

Table 1: Radio Frequency Specifications

| | GNSS-501 | GNSS-502 |
|--|---|--|
| Pass band (typical) | Upper GNSS Band: 1588.5 ± 23.0 MHz L-Band 1545.0 ± 20.0 MHz | Upper GNSS Band: 1588.5 ± 23.0 MHz Lower GNSS Band: 1207.0 ± 44.0 MHz L-Band 1545.0 ± 20.0 MHz |
| Out-of-band rejection (typical) band edges ± 50 MHz band edges ± 100 MHz | 15 dB (typical) 25 dB (typical) | 15 dB (typical) 25 dB (typical) |
| Gain at zenith ($\theta = 90^\circ$) (min) | L1/B1/E1/G1: +4.0 dBic L-Band: +4.0 dBic | L1/B1/E1/G1: +4.0 dBic L2/B2/G2/E5b: +4.0 dBic L-Band: +4.0 dBic |
| Gain roll-off (zenith to horizon) | L1/B1/E1/G1/L-Band 12 dB | L1/L2/B1/B2/E1/G1/G2/L-Band 12 dB |
| LNA gain (typical) | 29 dB | |
| Polarization | Right-hand circular | |
| Noise figure (typical) | 2.5 dB typical | |
| L1-L2 differential propagation delay (maximum) | - | 7 ns |
| Nominal impedance | 50 Ω | |
| VSWR | $\leq 2.0 : 1$ | |

Table 2: Power Specifications

| | |
|-------------------|----------------|
| Input voltage | 3.3 - 18.0 VDC |
| Current (typical) | 20 mA |

Table 3: Environmental Specifications

| | |
|-----------------------|---|
| Operating temperature | -40°C to +85°C (-40°F to +185°F) |
| Storage temperature | -55°C to +85°C (-67°F to +185°F) |
| Vibration (operating) | Random: MIL-STD-810G(CH1), 514.7 Annex E Procedure 1, Category 24 |
| Salt Fog | MIL-STD-810G(CH1), 509.6 |
| Shock | MIL-STD-810G(CH1), 516.7 (40 g) Procedure 1 |
| Bump | IEC 68-2-27 Ea (25 g) |
| Water Resistant | IP67, IP69K |

Table 4: Physical Specifications

| | |
|----------|------------------|
| Diameter | 155 mm (6.10") |
| Weight | 450 g (15.88 oz) |

WARRANTY POLICY

NovAtel Inc. warrants that its Global Navigation Satellite System (GNSS) products are free from defects in materials and workmanship, subject to the conditions set forth below, for the following periods of time:

| | |
|-------------------------|------------------|
| GPSAntenna™ Modules: | One (1) Year |
| Cables and Accessories: | Ninety (90) Days |

Date of sale shall mean the date of the invoice to the original customer for the product. NovAtel's responsibility respecting this warranty is limited solely to product repair at an authorized NovAtel location only. Determination of repair will be made by NovAtel personnel or by technical personnel expressly authorized by NovAtel for this purpose.

The foregoing warranties do not extend to

- (i) nonconformities, defects or errors in the products due to accident, abuse, misuse or negligent use of the products or use in other than a normal and customary manner, environmental conditions not conforming to NovAtel's specifications, or failure to follow prescribed installation, operating and maintenance procedures,
- (ii) defects, errors or nonconformities in the products due to modifications, alterations, additions or changes not made in accordance with NovAtel's specifications or authorized by NovAtel,
- (iii) normal wear and tear,
- (iv) damage cause by force of nature or act of any third person,
- (v) shipping damage; or
- (vi) service or repair of product by the dealer without prior written consent from NovAtel.


In addition, the foregoing warranties shall not apply to products designated by NovAtel as beta site test samples, experimental, developmental, preproduction, sample, incomplete or out of specification products or to returned products if the original identification marks have been removed or altered.

The warranties and remedies are exclusive and all other warranties, express or implied, written or oral, including the implied warranties of merchantability or fitness for any particular purpose are excluded.

NovAtel shall not be liable for any loss, damage or expense arising directly or indirectly out of the purchase, installation, operation, use or licensing or products or services. In no event shall NovAtel be liable for special, indirect, incidental or consequential damages of any kind or nature due to any cause.

There are no user-serviceable parts in the GPS Antenna and no maintenance is required. If the unit is faulty, replace with another unit and return the faulty unit to NovAtel Inc. You must obtain a RETURN MATERIAL AUTHORIZATION (RMA) number by calling NovAtel Customer Service at 1-800-NOVATEL (U.S. and Canada only) or 403-295-4900 before shipping any product to NovAtel or a dealer. You may also contact Novatel Customer Service by email at support@novatel.com. Once you have obtained an RMA number, you will be advised of proper shipping procedures to return any defective product. When returning any product to NovAtel, return the defective product in the original packaging to avoid damage.

WEEE NOTICE

If you purchased your GNSS-501 or GNSS-502 in Europe, return it to your dealer or supplier at the end of its life. The objectives of the European Community's environment policy are, in particular, to preserve, protect and improve the quality of the environment, protect human health and utilize natural resources prudently and rationally. Sustainable development advocates the reduction of wasteful consumption of natural resources and the prevention of pollution. Waste electrical and electronic equipment (WEEE) is a regulated area. Where the generation of waste cannot be avoided, it should be reused or recovered for its material or energy. WEEE products may be recognized by their wheeled bin label ()¹.

CE MARKING

The GNSS-501 and GNSS-502 antennas are CE marked to demonstrate compliance with the following European Union (EU) Directives:

- 2011/65/EU – Restriction of Hazardous Substances (RoHS)
- 1999/5/EC – Radio and Telecommunications Terminal Equipment (R&TTE)

FCC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

INDUSTRY CANADA

This device complies with CAN ICES-003(B) / NMB-3 (B).

PATENT NOTICE

The GNSS-501 and GNSS-502 are manufactured and protected under U.S. Patents #14/331,948 (patent pending).

QUESTIONS OR COMMENTS

If you have any questions or comments regarding your GNSS-501 or GNSS-502 antenna, contact NovAtel Customer Service using one of methods provided below.

Email: support@novatel.com
Web: www.novatel.com
Phone: 1-800-NOVATEL (International)
403-295-4900 (U.S. & Canada)
Fax: 403-295-4901

1. See www.novatel.com | [Products](#) | [WEEE and RoHS](#) for more information.



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