MANUAL

GNSS MULTI BAND Antenna
Antenna / Converter Unit

25th February 2020
Meinberg Funkuhren GmbH & Co. KG
# Table of Contents

1  Imprint .................................................. 1

2  Safety Hints Antenna .................................. 2

3  Before you start ........................................ 3
   3.1  Scope of delivery .................................. 3
   3.2  Disposal of Packaging Materials ................. 4

4  Installation GNSS Multiband Antenna ............... 5

5  Technical Specifications GNSS Multiband Antenna .. 9
   5.1  MBG S-PRO - Technical Specifications .......... 11
   5.1.1  MBG S-PRO - Physical Dimensions ............ 13
   5.1.2  Installation and Grounding .................... 13

6  RoHS and WEEE ......................................... 14

7  EU Declaration of Conformity ........................ 15
1 Imprint

Meinberg Funkuhren GmbH & Co. KG
Lange Wand 9, 31812 Bad Pyrmont / Germany

Phone: + 49 (0) 52 81 / 93 09 - 0
Fax: + 49 (0) 52 81 / 93 09 - 230

Internet: https://www.meinbergglobal.com
Mail: info@meinberg.de

Date: 2020-02-25
2 Safety Hints Antenna

WARNING!
DANGER TO LIFE BY ELECTRICAL SHOCK!

Make sure to comply with the occupational health and safety standards when installing the antenna. Never work without a proper fall protection device!

Do not carry out any installation or maintenance work on the antenna system or cabling when there is a potential risk of lightning.

Surge Voltage Protector
Due to extremely high currents associated with lightning no surge protection device can provide absolute safety from the impacts caused by lightning!
3 Before you start

3.1 Scope of delivery

Included in delivery of a Meinberg GNSS Multi Band antenna:

1. GNSS Multi Band antenna
2. Surge voltage protector (optional)
3. 20 m Antenna cable Belden H155
4. Coax cable for surge voltage protector (optional)
5. Retaining tube and clips for Meinberg GNSS Multi Band antenna
6. Mounting kit for Meinberg GNSS Multi Band antenna

Carefully unpack the system and all accessories and put them aside. Check the scope of delivery with the packing list to ensure that no parts are missing. If any of the listed contents are missing, please contact Meinberg Funkuhren.

Check the system for shipping damage. If the system is damaged or cannot be put into operation, contact Meinberg Funkuhren immediately. Only the recipient (the person or company receiving the system) can assert a claim against Freight Forwarder for shipping damage.

Meinberg recommends that you keep the original packaging materials for possible future transport.
## 3.2 Disposal of Packaging Materials

The packaging materials we use are fully recyclable:

<table>
<thead>
<tr>
<th>Material</th>
<th>Use for</th>
<th>Disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polystyrol</td>
<td>packaging frame/filling material (polystyrene peanuts, bubble wrap)</td>
<td>Recycling Depot</td>
</tr>
<tr>
<td>PE-LD</td>
<td>accessories packaging</td>
<td>Recycling Depot</td>
</tr>
<tr>
<td>Polyethylene</td>
<td>Polyethylene low density</td>
<td></td>
</tr>
<tr>
<td>Cardboard</td>
<td>shipping packaging, accessories packaging</td>
<td>Paper recycling</td>
</tr>
</tbody>
</table>
4 Installation GNSS Multiband Antenna

**WARNING!**
Antenna mounting without effective anti-fall protection

**Danger to life due to fall!**
- Pay attention to effective working safety when installing antennas!
- **Never** work without an effective anti-fall equipment!

**WARNING!**
Working on the antenna system during thunderstorms

**Danger to life due to electrical shock!**
- Do **not** carry out any work on the antenna system or the antenna cable if there is a risk of a lightning strike.
- Do **not** carry out any work on the antenna system if the safety distance to free lines and sequential circuits is exceeded.

1. Selection of the Antenna location

To receive enough satellites, select a location that allows an unobstructed view of the sky, otherwise there may be problems with the synchronization of the system. There should be no obstacle in the line of sight between the antenna and the satellites. In addition, the antenna must not be installed under high-voltage lines or other electrical light or electric circuits.

**Installation conditions for optimal operation:**

- Free view from 8° above the horizon or
- free view towards equator (if free view of 8° not possible) or
- clear view between 55th southern and 55th northern latitude (satellite orbits).

If this view is also restricted, there may be complications in case four satellites have to be found for a calculation of a new position.
Antenna Mounting

1.

Mount the antenna at a minimum distance of 50 cm from other antennas to an vertical pole up to 60 mm outer diameter or on a wall with the mounting kit included in the scope of delivery.

Then connect the antenna cable (Belden H155) to the N-Norm connector of the antenna. Lead the other end of the cable through the wall into the building.

Free view to the sky!

Make sure that the maximum cable length is kept when installing the antenna cable between the antenna and receiver. This depends on the type of cable used (H155, RG58) and its damping factor.
2.

The optional overvoltage protection MBG S-PRO can be mounted now. This is also suitable for outdoor installation (protection class: IP55). However, Meinberg recommends an installation in closed rooms, just after the antenna cable has entered the wall, in order to reduce the risk of overvoltage damage, e.g. due to lightning strikes.

Connect the other side of the antenna cable to the surge protection socket.

3.

The next step is to connect the supplied coaxial cable between the surge protector and receiver.
Antenna splitter option

Several receivers can be connected to one antenna via the antenna splitter. Make sure, that the total length of a route going from the antenna via the splitter to the receiver, does not exceed the maximum cable length. The splitter can be installed at any position between antenna or, if used, the surge protector and receiver.

Compensation the signal propagation time of the antenna cable

The receiving satellite signal is delayed by the used coaxial cable. The connected receiver must compensate the signal propagation time of the antenna cable, therefore you need to enter the length of the antenna cable in meters or the compensation time in nanoseconds into the settings of your receiver.

Antenna Cable Length (m):

<table>
<thead>
<tr>
<th>Cable</th>
<th>Delay</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>RG58U</td>
<td>5 ns/m</td>
<td>for GPS180 and GNS-UC</td>
</tr>
<tr>
<td>H155</td>
<td>4 ns/m</td>
<td>for GNS180 and GN180</td>
</tr>
</tbody>
</table>

By entering the cable length (from antenna to receiver), the system calculates the delay time and compensates it automatically. The default value of 20 m is preconfigured at delivery.

For other coaxial cable types please use the option "by delay". The delay must be calculated by yourself by using the information in the data sheet of the respective coaxial cable.
5 Technical Specifications GNSS Multiband Antenna

Physical Dimensions:
Specifications:

Power supply: 5 V - 16 V, 24 mA (via antenna cable)

Antenna input GNSS: Antenna circuit insulated, dielectric strenght 1000V

Frequency ranges: 1164 MHz to 1254 MHz and 1525 MHz to 1606 MHz

Overall LNA gain: 37 dB typ, 35 dB min

LNA noise figure: 2.5 dB typ at 25 °C

Supported frequency bands:

GPS L1/L2/L5
GLONASS G1/G2/G3
Beidou B1/B2
Galileo E1/E5a+b plus L-band

Out-of-band rejection:

<table>
<thead>
<tr>
<th>Freq. Band L5/E5/L2/G2</th>
<th>Frequency</th>
<th>Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 1050 MHz</td>
<td>&gt; 45 dB</td>
</tr>
<tr>
<td></td>
<td>&lt; 1125 MHz</td>
<td>&gt; 30 dB</td>
</tr>
<tr>
<td></td>
<td>&lt; 1350 MHz</td>
<td>&gt; 45 dB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Freq. Band L1/E1/B1/G1</th>
<th>Frequency</th>
<th>Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 1450 MHz</td>
<td>&gt; 30 dB</td>
</tr>
<tr>
<td></td>
<td>&lt; 1690 MHz</td>
<td>&gt; 30 dB</td>
</tr>
<tr>
<td></td>
<td>&lt; 1730 MHz</td>
<td>&gt; 40 dB</td>
</tr>
</tbody>
</table>

Connector: N-Norm, female

Form factor: ABS plastic case for outdoor installation

Protection class: IP66

Humidity: 95%

Temperature range: -40 °C to +85 °C (-40 to 185 °F)

Weight: 1.6 kg (3.53 lbs) incl. mounting kit
5.1 MBG S-PRO - Technical Specifications

Attachment plug with replaceable gas discharge tube for coaxial signal interfaces. Connection: N connector female/female. The MBG S-PRO set includes a surge voltage protector (Phoenix CN-UB-280DC-BB), a pre-assembled coax cable and a mounting bracket.

The surge voltage protector for coaxial lines has to be installed in the antenna line. The shield has to be connected to earth as short as possible. CN-UB-280DC-BB is equipped with two type-N female connectors. It has no dedicated input/output polarity or preferred mounting orientation.

Phoenix CN-UB-280DC-BB

Features:

- High RF Performance
- Multiple Strike Capability
- 20 kA Surge Protection
- Bi-directional Protection

<table>
<thead>
<tr>
<th>Mounting type</th>
<th>Connection-specific intermediate plugging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Attachment plug</td>
</tr>
<tr>
<td>Direction of action</td>
<td>Line-Shield/Earth Ground</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum continuous operating voltage</th>
<th>UC (wire-ground) 280 V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>195 V AC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nominal current</th>
<th>5 A (25 °C)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Operating effective current</th>
<th>IC at UC  ≤ 1 μA</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Nominal discharge current</th>
<th>20 kA</th>
</tr>
</thead>
<tbody>
<tr>
<td>In (8/20) μs (Core-Earth)</td>
<td></td>
</tr>
<tr>
<td>In (8/20) μs (Core-Shield)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total surge current</th>
<th>20 kA</th>
</tr>
</thead>
<tbody>
<tr>
<td>(8/20) μs</td>
<td></td>
</tr>
<tr>
<td>(10/350) μs</td>
<td>2,5 kA</td>
</tr>
</tbody>
</table>
Max. discharge current

\( I_{\text{max}} (8/20) \mu s \text{ maximum (Core-Shield)} \) 20 kA

Nominal pulse current

\( I_{\text{n}} (10/1000) \mu s \text{ (Core-Shield)} \) 100 A

Impulse discharge current

(10/350) \( \mu s \), peak value \( I_{\text{imp}} \) 2.5 kA

Output voltage limitation

at 1 kV/\( \mu s \) (Core-Earth) spike \( \leq 900 \text{ V} \)

Response time

\( t_{\text{A}} \) (Core-Earth) \( \leq 100 \text{ ns} \)

\( t_{\text{A}} \) (Core-GND) \( \leq 100 \text{ ns} \)

Input attenuation

\( a_{\text{E}}, \text{ asym.} \) typ. 0.1 dB \((\leq 1.2 \text{ GHz})\)

typ. 0.2 dB \((\leq 2.2 \text{ GHz})\)

Cut-off frequency

\( f_{\text{g}} \) (3 dB), asym. (shield) in 50 Ohm system \( > 3 \text{ GHz} \)

Standing wave ratio

SWR in a 50 \( \Omega \) system typ. 1.1 \((\leq 2 \text{ GHz})\)

Permissible HF power

\( P_{\text{max}} \) at VSWR = \( xx \) (50 ohm system)

700 W (VSWR = 1.1)

200 W (VSWR = \( \infty \))

Capacity

(Core-Earth) typ. 1,5 pF

asymmetrical (shield) typ. 1,5 pF

Surge current resistance

(conductor-ground)

C1 - 1 kV/500 A

C2 - 10 kV/5 kA

C3 - 100 A

D1 - 2.5 kA

Ambient temperature

(operation) \(-40 ^\circ \text{C} ... 80 ^\circ \text{C}\)

Altitude

\( \leq 2000 \text{ m (above sea level)} \)

Degree of protection

IP55

Housing material

Nickel-plated brass

Color nickel

Dimensions

Height 25 mm, Width 25 mm, Depth 67 mm

Connection data

IN N-Connector 50 Ohm

OUT N-Connector Buchse

N-Connector Buchse

Standards/regulations


Source: PHOENIXCONTACT.COM Surge Voltage Protector - CN-UB-280DC-BB
5.1.1 MBG S-PRO - Physical Dimensions

5.1.2 Installation and Grounding
6 RoHS and WEEE

Compliance with EU Directive 2011/65/EU (RoHS)

We hereby declare that this product is conform to the European Directive 2011/65/EU and its delegated directive 2015/863/EU “Restrictions of Hazardous Substances in Electrical and Electronic Equipment”. We ensure that electrical and electronic products sold in the EU do not contain lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls (PBBs), and polybrominated diphenyl ethers (PBDEs), Bis(2-ethylhexyl)phthalate (DEHP), Benzylbutylphthalate (BBP), Dibutylphthalate (DBP), Diisobutylphthalate (DIBP), above the legal threshold.

WEEE status of the product

This product is handled as a B2B (Business to Business) category product. In order to secure a WEEE compliant waste disposal it has to be returned to the manufacturer. Any transportation expenses for returning this product (at its end of life) have to be incurred by the end user, whereas Meinberg will bear the costs for the waste disposal itself.
7 EU Declaration of Conformity

Konformitätserklärung
Doc ID: -2020-02-25

Hersteller
Meinberg Funkuhren GmbH & Co. KG
Manufacturer
Lange Wand 9, D-31812 Bad Pyrmont

erklärt in alleiniger Verantwortung, dass das Produkt,
declares under its sole responsibility, that the product

Produktbezeichnung
GNSS Multi Band Antenna
Product Designation

auf das sich diese Erklärung bezieht, mit den folgenden Normen und Richtlinien übereinstimmt:
to which this declaration relates is in conformity with the following standards and provisions of the directives:

<table>
<thead>
<tr>
<th>Richtlinie</th>
<th>Normen</th>
</tr>
</thead>
<tbody>
<tr>
<td>RED – Richtlinie</td>
<td>ETSI EN 303 413 V1.1.1 (2017-06)</td>
</tr>
<tr>
<td>EMC – Richtlinie</td>
<td>Draft ETSI EN 301 489-1 V2.2.0 (2011-09) Draft ETSI EN 301 489-19 V2.1.0 (2011-09) DIN EN 61000-6-2:2005</td>
</tr>
<tr>
<td>2014/35/EU</td>
<td></td>
</tr>
<tr>
<td>RoHS – Richtlinie</td>
<td>DIN EN 50581:2012</td>
</tr>
<tr>
<td>2011/65/EU + 2015/863/EU</td>
<td></td>
</tr>
</tbody>
</table>

Bad Pyrmont, den 2020-02-25

Stephan Meinberg
Production Manager