MANUAL

GPSANT

Antenna / Converter Unit

27th June 2019

Meinberg Funkuhren GmbH & Co. KG
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1 Imprint

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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 Meinberg GPS Antenna/Converter Unit

- Antenna/Converter Unit
- Preformed Cable
- Holder for Wall Mounting
- Clamps for Pole Mounting
- Optional: Voltage Protector

Supported Receiver Types:
GPS161, GPS162, GPS163, GPS164, GPS165, GPS167, GPS170, GPS180, GPSGEN1575, GNS181-UC (GPS, Galileo)

Antenna: Antenna/converter unit with remote power supply
Length of cable: Refer to chapter "Mounting the Antenna"

Antenna Input
GPS: Antenna circuit 1000 V DC insulated

Receiver Input Frequency: 1575.42 MHz (L1)

Local Oscillator to Converter Frequency: 10 MHz \(^1\)

First IF Frequency: 35.4 MHz \(^1\)

Connector: female type-N

Protection Class: IP66

Ambient Temperature: \(-60^\circ\text{C} \ldots +80^\circ\text{C}\)

Humidity: 95%

Weigh: 420g (without accessories)

\(^1\) these frequencies are transferred via the antenna cable.
Power Requirements: 15 V, 100mA (via antenna cable)
Physical Dimensions:
3.1 Supported Receiver Types

**GPS Receiver**

- **Receiver:** 12 channel GPS C/A-code receiver
- **Antenna Cable:** shielded coax
- **Cable Length:** max. 300 m to RG58, max. 700 m to RG213
- **Antenna Connector:** BNC female
- **Input GPS:** Antenna circuit
  - 1000 V DC insulated
- **Power Requirements:** 15 V, 100 mA (from GPS receiver via antenna cable)

**GNS-UC Clock**

GPS and Galileo Satellite Receiver with Up-Converter

The GNS-UC unit has a special receiver concept which is able to capture GPS and Galileo signals using a standard Meinberg antenna/converter unit. The configuration supports to select one of these to be used exclusively or the combination of the sources.

- **Type of receiver:** 72 channel receiver
  - GPS/Galileo
- **Frequency band:**
  - GPS: L1C/A
  - Galileo: E1B/C
- **Cable Length:** max. 300m (RG58 coax-cable)
- **Type of Connector:** female BNC connector
- **Power Requirements:** 15 V, 100 mA (via antenna cable)
3.2 Mounting the GPS Antenna

The GPS satellites are not stationary, but circle round the globe with a period of about 12 hours. They can only be received if no building is in the line-of-sight from the antenna to the satellite, so the antenna/downconverter unit must be installed in a location that has as clear a view of the sky as possible. The best reception is achieved when the antenna has a free view of $8^\circ$ angular elevation above the horizon. If this is not possible, the antenna should be installed with the clearest free view to the equator, because the satellite orbits are located between latitudes 55° North and 55° South. If this is not possible, you may experience difficulty receiving the four satellites necessary to complete the receiver’s position solution.

The antenna/converter unit can be mounted on a wall, or on a pole up to 60 mm in diameter. A 50 cm plastic tube, two wall-mount brackets, and clamps for pole mounting are included. A standard RG58 coaxial cable should be used to connect the antenna/downconverter unit to the receiver. The maximum length of cable between antenna and receiver depends on the attenuation factor of the coaxial cable.

Up to four receivers can be run with one antenna/downconverter unit by using an optional antenna splitter. The total length of an antenna line from antenna to receiver must not be longer than the max. length shown in the table below. The position of the splitter in the antenna line does not matter.

The optional delivered MBG S-PRO protection kit can also be used for outdoor installation (degree of protection: IP55). However, we recommend an indoor installation, as close as possible to the wall where the antenna cable is entering, to minimize the risk of overvoltage damage, for example by lightning.

### 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.
3.2.1 Antenna Cable:

<table>
<thead>
<tr>
<th>Type of cable</th>
<th>diameter Ø [mm]</th>
<th>Attenuation at 100MHz [dB]/100m</th>
<th>max lengt. [m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>RG58/CU</td>
<td>5</td>
<td>17</td>
<td>300 (1)</td>
</tr>
<tr>
<td>RG213</td>
<td>10.5</td>
<td>7</td>
<td>700 (1)</td>
</tr>
</tbody>
</table>

(1) This specifications are made for antenna/converter units produced after January, 2005. The values are typically ones; the exact ones are to find out from the data sheet of the used cable.

3.2.2 Antenna Short-Circuit

(systems with front display only)

In case of an antenna line short-circuit the following message appears in the display:

ANTENNA SHORT-CIRCUIT
DISCONNECT POWER !!!

If this message appears the clock has to be disconnected from the mains and the defect eliminated. After that the clock can be powered-up again. The supply voltage for the antenna/converter unit is approx. 18.5 V DC in idle mode and approx. 16 V DC when the GPS antenna is connected.
3.2.3 Antenna Assembly with Surge Voltage Protection

Optional a surge voltage protector for coaxial lines is available. The shield has to be connected to earth as short as possible by using the included mounting bracket. Normally you connect the antenna converter directly with the antenna cable to the system.

Ground lead to PE rail
(Protective Earth)
Cable ca. 1.5 mm Ø
fastened at the surge protector

GPS Antenna
free view to the sky!
Cable Slot
N-Norm female
N-Norm male
N-Norm male
N-Norm female
N-Norm female
N-Norm male
Meinberg GPS
N-Norm male female
or BNC male female

as short as possible
### 3.3 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](image)

**Features:**
- High RF Performance
- Multiple Strike Capability
- 20 kA Surge Protection
- Bi-directional Protection
- Rugged and Waterproof

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting type</td>
<td>Connection-specific intermediate plugging</td>
</tr>
<tr>
<td>Type</td>
<td>Attachment plug</td>
</tr>
<tr>
<td>Direction of action</td>
<td>Line-Shield/Earth Ground</td>
</tr>
<tr>
<td>Maximum continuous operating voltage</td>
<td>UC (wire-ground) 280 V DC</td>
</tr>
<tr>
<td></td>
<td>195 V AC</td>
</tr>
<tr>
<td>Nominal current</td>
<td>IN 5 A (25 ºC)</td>
</tr>
<tr>
<td>Operating effective current</td>
<td>IC at UC ≤ 1 µA</td>
</tr>
<tr>
<td>Nominal discharge current</td>
<td>In (8/20)µs (Core-Earth) 20 kA</td>
</tr>
<tr>
<td>Nennableitstoßstrom</td>
<td>In (8/20)µs (Core-Shield) 20 kA</td>
</tr>
<tr>
<td>Total surge current</td>
<td>(8/20)µs 20 kA</td>
</tr>
<tr>
<td>Total surge current</td>
<td>(10/350)µs 2,5 kA</td>
</tr>
<tr>
<td>Parameter</td>
<td>Specification</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>----------------------------------------------------</td>
</tr>
<tr>
<td>Max. discharge current</td>
<td>$I_{\text{max}}(8/20) \mu s$ maximum (Core-Shield) 20 kA</td>
</tr>
<tr>
<td>Nominal pulse current</td>
<td>$I_{\text{an}}(10/1000) \mu s$ (Core-Shield) 100 A</td>
</tr>
<tr>
<td>Impulse discharge current</td>
<td>$(10/350) \mu s$, peak value $I_{\text{imp}}$ 2.5 kA</td>
</tr>
<tr>
<td>Output voltage limitation</td>
<td>at 1 kV/$\mu$s (Core-Earth) spike $\leq 900$ V</td>
</tr>
<tr>
<td>Output voltage limitation</td>
<td>at 1 kV/$\mu$s (Core-Earth) spike $\leq 900$ V</td>
</tr>
<tr>
<td>Response time</td>
<td>$t_{\text{A}}$ (Core-Earth) $\leq 100$ ns</td>
</tr>
<tr>
<td>Response time</td>
<td>$t_{\text{A}}$ (Core-GND) $\leq 100$ ns</td>
</tr>
<tr>
<td>Input attenuation</td>
<td>$a_{\text{E}}$, asym. typ. 0.1 dB ($\leq 1.2$ GHz)</td>
</tr>
<tr>
<td>Cut-off frequency</td>
<td>$f_{\text{g}}(3 , \text{dB})$, asym. (shield) in 50 Ohm system $&gt; 3$ GHz</td>
</tr>
<tr>
<td>Standing wave ratio</td>
<td>SWR in a 50 Ω system typ. 1.1 ($\leq 2$ GHz)</td>
</tr>
<tr>
<td>Permissible HF power</td>
<td>$P_{\text{max}}$ at VSWR = xx (50 ohm system) 700 W (VSWR = 1.1) 200 W (VSWR = $\infty$)</td>
</tr>
<tr>
<td>Capacity</td>
<td>(Core-Earth) typ. 1.5 pF</td>
</tr>
<tr>
<td>Capacity</td>
<td>asymmetrical (shield) typ. 1.5 pF</td>
</tr>
<tr>
<td>Surge current resistance</td>
<td>(conductor-ground) C1 - 1 kV/500 A</td>
</tr>
<tr>
<td></td>
<td>C2 - 10 kV/5 kA</td>
</tr>
<tr>
<td></td>
<td>C3 - 100 A</td>
</tr>
<tr>
<td></td>
<td>D1 - 2.5 kA</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>(operation) -40 °C ... 80 °C</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP55</td>
</tr>
<tr>
<td>Housing material</td>
<td>Nickel-plated brass Color nickel</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Height 25 mm, Width 25 mm, Depth 67 mm</td>
</tr>
<tr>
<td>Connection data</td>
<td>N-Connector 50 Ohm N-Connector Buchse</td>
</tr>
<tr>
<td>Standards/regulations</td>
<td>IEC 61643-21</td>
</tr>
</tbody>
</table>

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

3.3.2 Installation and Grounding
3.4 Features of GOAL

GOAL is a GPS Optical Antenna Link set for connecting a Meinberg GPS antenna to a Meinberg GPS receiver via one optical multimode fiber. The module GOAL/R is to connect to the receivers antenna input via a patch cable and can be assembled somewhere around. The module GOAL/A is to mount indoor, connected to the Meinberg antenna via a coaxial cable.

Both modules are linked to each other via a single GI50/125μm or GI62,5/125μm multimode gradient fiber.

This kind of connection provides several advantages:
- large antenna cable distances (up to 2000 mtrs.)
- no destructive overvoltage via the antenna cable
- no unintentional monitoring via optical fiber

The receiver-side module GOAL/R is supplied with power via the antenna input connector of the GPS receiver, therefore no external power supply is necessary. The module GOAL/A needs an external supply for operating and feeding the GPS antenna. Whenever the antenna is not connected, or a short circuit occurs on the antenna cable, this is shown by a status LED in the front panel. A second status LED shows that the 10MHz reference clock, coming from the GOAL/R, is received within a sufficient signal strength and therefore the FO link is working.

The GOAL system is suitable for all Meinberg GPS receivers (except GPS166!), also for the later extension of existing systems. When using the GOAL system together with the GPS signal converter GPSGEN1575 it is to be noted that operation of connected GPS receivers from third-party manufacturers can not be guaranteed!

Physical Dimensions:
GOAL/A: 44mm x 105mm x 165mm (height x width x depth)
GOAL/R: 25mm x 25mm x 95mm (height x width x depth)
4 Antenna Accessories

A mounting kit and accessories are always supplied for installation and commissioning:

1  1 x antenna
2  1 x antenna cable
3  1 x pole
4  2 x mounting brackets

A  2 x pole clamp holder
B  2 x pole clamp
C  4 x dowels for wall mounting (8mm)
D  4 x screw for wall mounting (6mm)
E  4 x nut for mast clamp (6mm)
F  4 x spacer sleeve for mast clamp (6mm)
G  8 x nut for antenna holder (5mm)
H  8 x screw for antenna holder (5mm)
5 EU Declaration of Conformity

Konformitätserklärung

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Hersteller

Meinberg Funkuhren GmbH & Co. KG

Manufacturer

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

Produktbezeichnung

GPSANT - Antenna/Converter Unit

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:

RED – Richtlinie

RED – Directive

ETSI EN 300 440-1 V1.6.1 (2010-08)

ETSI EN 300 440-2 V1.4.1 (2010-08)

2014/53/EU

EMV – Richtlinie

EMC – Directive

ETSI EN 301 489-1 V1.9.2 (2011-09)

DIN EN 61000-6-2:2005

DIN EN 61000-6-3:2007 + A1:2011

DIN EN 55032:2012

DIN EN 55024:2010

2014/30/EU

Niederspannungsrichtlinie

Low-voltage Directive


2014/35/EU

RoHS – Richtlinie

RoHS – Directive

DIN EN 50581:2012

2011/65/EU

Bad Pyrmont, den 2019-06-27

Stephan Meinberg

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