



The Synchronization Experts.



## **MANUAL**

### **GPS Antenna**

#### **Antenna / Converter Unit**

February 23, 2022

Meinberg Funkuhren GmbH & Co. KG



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# 1 Imprint

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Date: February 23, 2022

## 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!

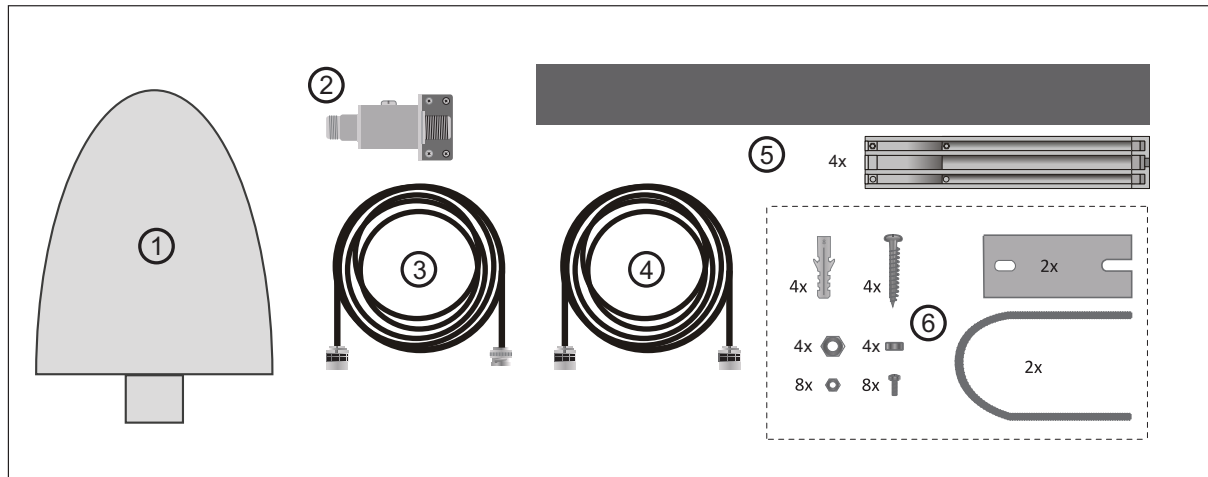
Do not carry out any installation or maintenance work on the antenna system or cabling when there is a potential risk of lightning.

### **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 GPS antenna:

1. GPS antenna
2. Surge voltage protector (optional)
3. 20 m Antenna cable RG58U (optional)
4. Coax cable for surge voltage protector (optional)
5. Retaining tube and clips for Meinberg GPS antenna
6. Mounting kit for Meinberg GPS 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:

Material	Use for	Disposal
Polystyrol	packaging frame/filling material (polystyrene peanuts, bubble wrap)	Recycling Depot
PE-LD Polyethylene low density	accessories packaging	Recycling Depot
Cardboard	shipping packaging, accessories packaging	Paper recycling

## 4 Installation of the GPS Antenna

**WARNING!**

Do not mount the antenna without an effective fall arrester!

**Danger of death from falling!**

- Ensure that you work safely when installing antennas!
- Never work without an effective fall arrester!

**WARNING!**

Do not work on the antenna system during thunderstorms!

**Danger of death from electric shock!**

- Do not carry out any work on the antenna system or the antenna cable if there is a risk of lightning strike.
- Do not carry out any work on the antenna system if it is not possible to maintain the prescribed safe distance to exposed lines and electrical substations.



### Selecting the Antenna Location

To avoid difficulties with synchronization, select a location that allows for an unobstructed view of the sky so as to ensure that enough satellites can be found. The line of sight between the antenna and satellites should not be obstructed in any way. The antenna must also not be installed under power lines or other electrical lighting or power circuits.

**Installation Conditions for Optimum Operation:**

- clear view of 8° above the horizon or
- clear view towards equator (if clear view of 8° not possible) or
- clear view between 55th north and 55th south parallels (satellite orbits).



Problems may arise if all of these views are obstructed, as four satellites must be located to calculate a new position.

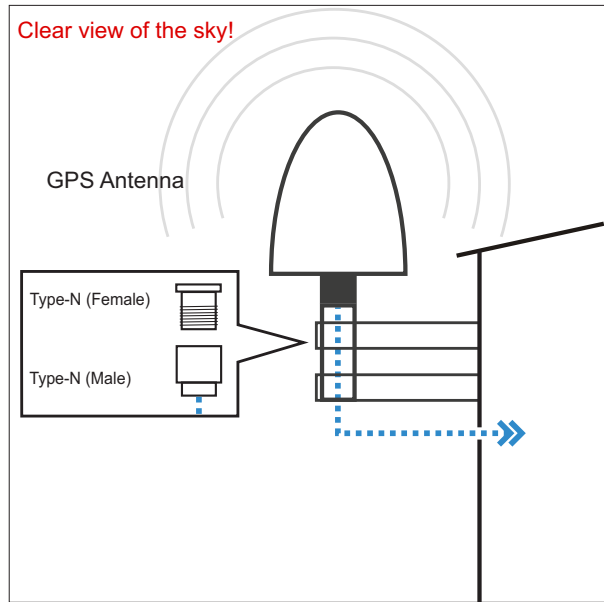


## Mounting the Antenna

1.

Use the included mounting kit to mount the antenna at a distance of 50 cm from other antennas, either on a vertical pole of a diameter of no more than 60 mm, or directly onto a wall.

The antenna cable should then be connected to the Type-N connector of the antenna.

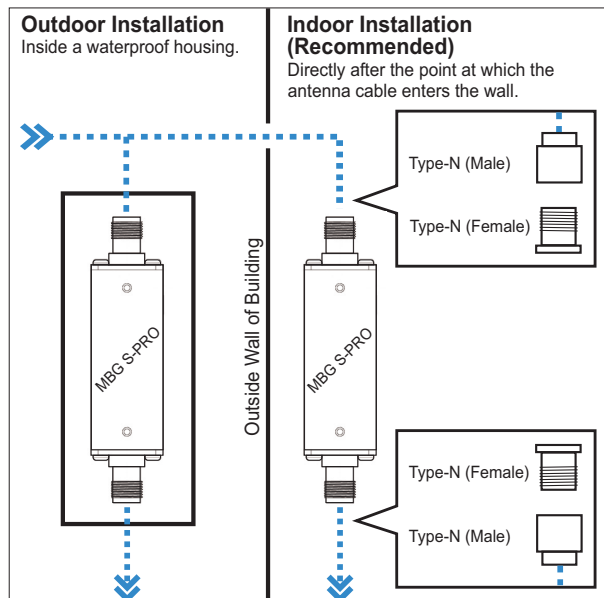


Make sure that the maximum cable length is not exceeded when installing the antenna cable between the antenna and receiver. The maximum length will depend on the type of cable used (H155, RG58) and its attenuation factor.

2.

Voltage surges (e.g., caused by lightning strike) may be transmitted along the antenna cable and cause damage to the receiver. Using a MBG S-PRO surge protector can help to protect your receiver against such surges.

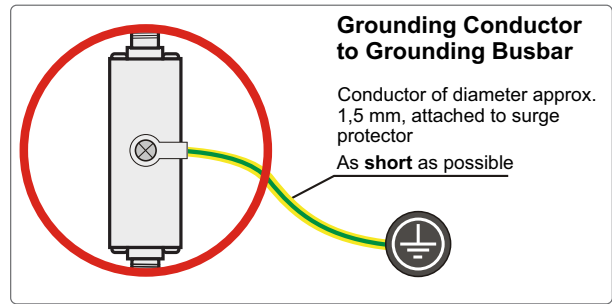
If installed in a waterproof housing, the MBG S-PRO can be installed outdoors. However, Meinberg recommends installing the surge protector indoors—as closely to the entrance point of the antenna cable as possible—in order to minimize the risk of surge damage (such as that caused by lightning strike).



3.

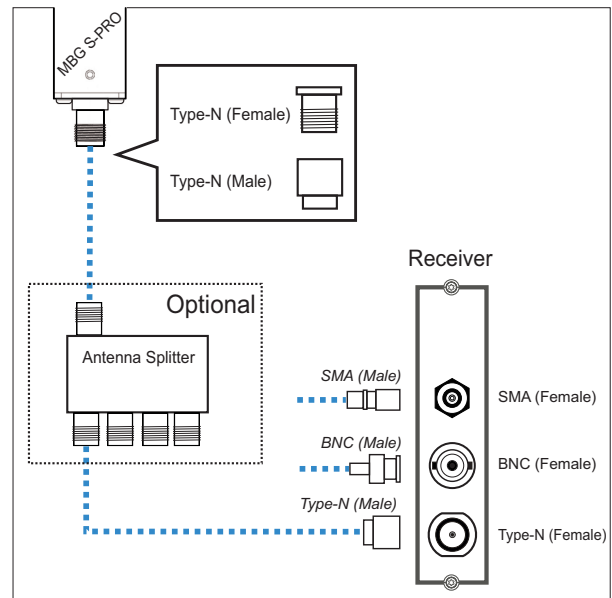
To ground the antenna cable, connect the surge protector to a grounding busbar using a grounding conductor (see illustration).

Once installation is complete, connect the other end of the antenna cable to the surge protector female connector.



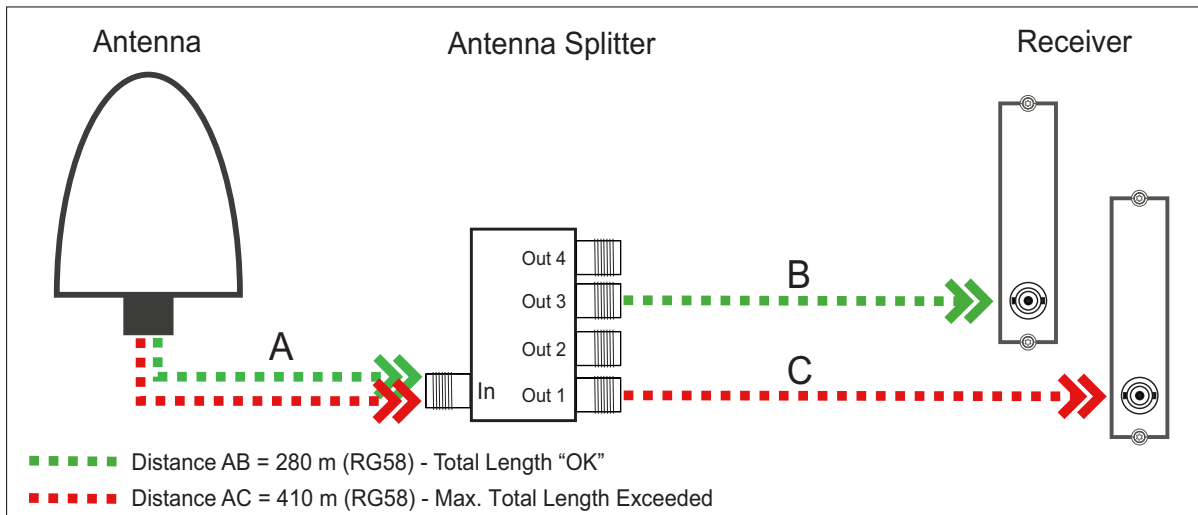
4.

The next step is to connect the supplied coaxial cable from the surge protector to the receiver.



## Optional Antenna Splitter

Multiple receivers can be connected to one antenna using the antenna splitter. When doing so, be aware that the total distance, comprising the cable from the antenna to the splitter, and from there to the receiver, must not exceed the maximum cable length. The splitter may be installed at any location between the surge protector and the receivers.



## Compensating for Signal Propagation Delay in the Antenna Cable

To enable the connected receiver to compensate for the signal propagation delay inherent in the antenna cable, you will need to enter either the length of your antenna cable in meters or the offset time in nanoseconds into your receiver.

### Antenna Cable Length (m):

The satellite signal reception is delayed as a result of coaxial cable used.

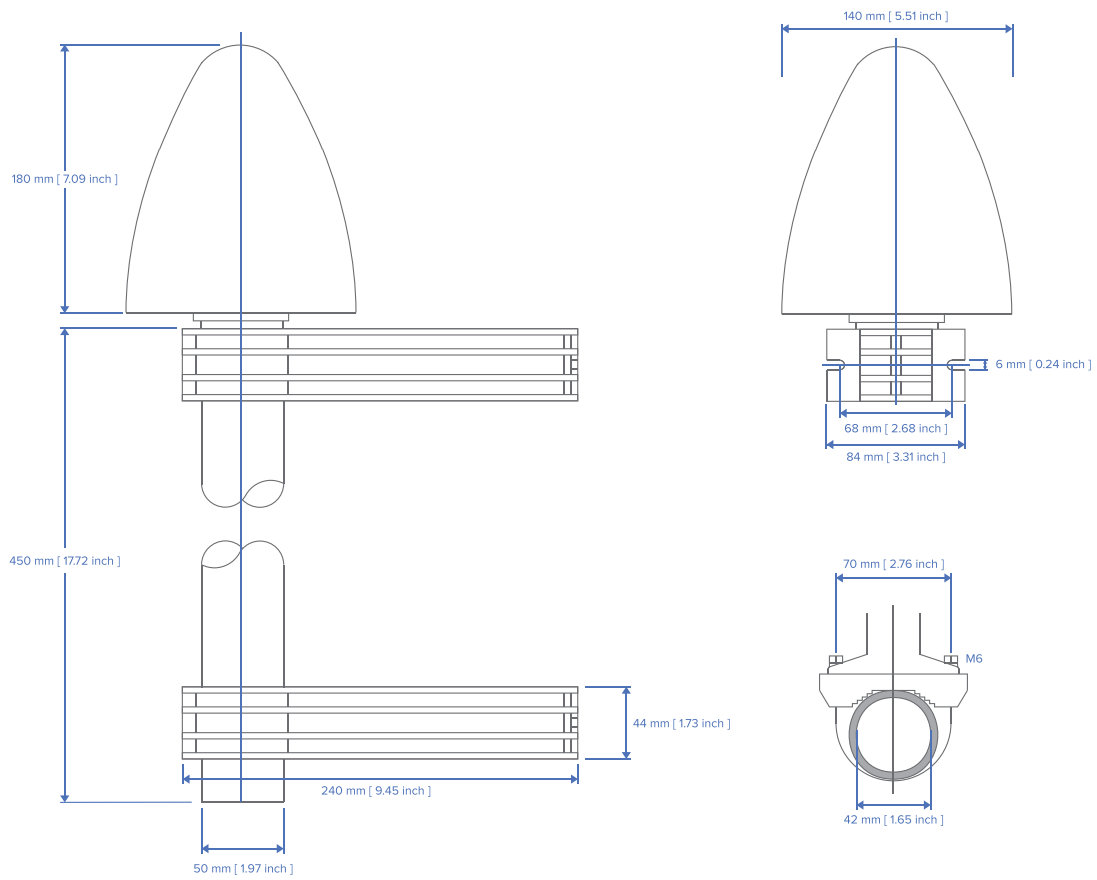
Cable	Delay	Usage
RG58U	5 ns/m	For GPS and GNS-UC receivers
H155	4 ns/m	For GNS and GNM receivers

The cable length entered (from antenna to receiver) is used by the system to calculate the delay time and to automatically compensate for propagation delay. A value of 20 m is set by default.

When using a different type of coaxial cable, please use the "By Delay" option. You will need to calculate the delay yourself using the information provided in the product specifications provided by the manufacturer of your coaxial cable.

# 5 Technical Appendix: GPS Antenna + Accessories

Physical Dimensions:



## Specifications:

Power Supply:	15 V, 100 mA (Provided via Antenna Cable)	
Reception Frequency:	1575.42 MHz	
Bandwidth:	9 MHz	
Frequencies:	Mixed Frequency	10 MHz
	IF frequency:	35.4 MHz
Connector:	Type-N Female	
Form Factor:	ABS Plastic Case for Outdoor Installation	
IP Rating:	IP66	
Humidity:	95 %	
Temperature Range:	-60 °C to +80 °C (-76 to 176 °F)	
Weight:	1.6 kg (3.53 lbs), Including Mounting Kit	

## 5.1 Antenna Cable

Cable Type	Cable Diameter (mm/in)	Attenuation at 100 MHz (db)/100 m/328 ft	Max. Cable Length (m/ft)	Used for Receiver Type
RG58/CU	5/0.2	17	300/984	GPS/GNS-UC/PZF
RG213	10.3/0.41	7	700/2297	GPS/GNS-UC
H155	5.4/0.21	9.1	70/230	GNM/GNS
H2010 Ultraflex	7.3/0,29	5.8	150/492	GNM/GNS

Please refer to the data sheet of the cable in question for further specifications.

## 5.2 Antenna Short Circuit



This information only applies to devices with a front display.

If the antenna line is short-circuited, the following message will be shown on the display:

```
Antenna Short-Circuit
Disconnect Power!!!
```

If this message appears, the clock must be switched off and the cause of the problem must be eliminated before the clock can be switched back on. The supply voltage for the antennas/converter unit is around 15 V DC with the antenna connected.

### 5.3 Technical Specifications: MBG S-PRO Surge Protection

Adapter plug with replaceable gas discharge tube for coaxial signal connections.

Connector Type: Type-N connector female/female. The MBG S-PRO set includes a surge protector (Phoenix CN-UB-280DC-BB), a pre-assembled coaxial cable, and a mounting bracket.

The coaxial cable surge protector must be installed on the antenna line. The shielding is grounded using a conductor that is short as possible. The CN-UB-280DC-BB is equipped with two Type-N female connectors and has no dedicated input/output polarity and no preferred installation orientation.



Phoenix CN-UB-280DC-BB

**Features:**

- High RF Performance
- Multiple Strike Capability
- 20 kA Surge Protection
- Bidirectional Protection

<b>Installation Method:</b>	Connector Type-Specific Adapter Plug	
<b>Direction of Action:</b>	Line Shield/Earth Ground	
<b>Maximum Continuous Operating Voltage:</b>	UC (Wire-Ground) 195 V AC	280 V DC
<b>Rated Current:</b>	IN	5 A (25 °C)
<b>Effective Operating Current:</b>	IC at UC	≤ 1 μA
<b>Rated Discharge Current:</b>	In (8/20) μs (Core-Earth) In (8/20) μs (Core-Shield)	20 kA 20 kA
<b>Total Surge Current:</b>	(8/20) μs (10/350) μs	20 kA 2.5 kA

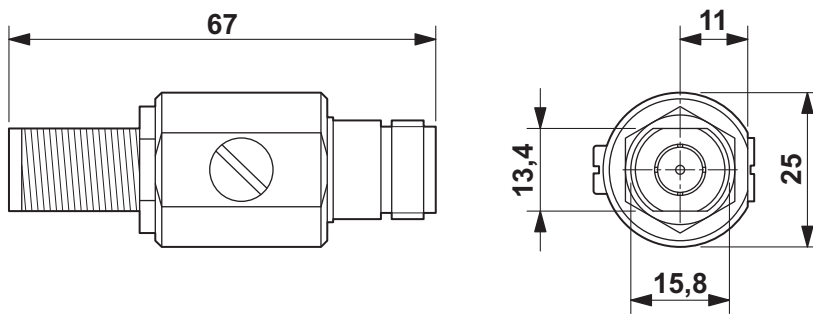
<b>Max. Discharge Current:</b>	$I_{\max}$ (8/20) $\mu$ s Maximum (Core-Shield)	20 kA
<b>Rated Pulse Current:</b>	$I_{\text{an}}$ (10/1000) $\mu$ s (Core-Shield)	100 A
<b>Impulse Discharge Current:</b>	(10/350) $\mu$ s, Peak Value $I_{\text{imp}}$	2.5 kA
<b>Output Voltage Limit:</b>	At 1 kV/ $\mu$ s (Core-Earth) spike At 1 kV/ $\mu$ s (Core-Earth) spike	$\leq 900$ V $\leq 900$ V
<b>Response Time:</b>	$t_A$ (Core-Earth) $t_A$ (Core-GND)	$\leq 100$ ns $\leq 100$ ns
<b>Input Attenuation:</b>	aE, asym.	Typically 0.1 dB ( $\leq 1.2$ GHz) Typically 0.2 dB ( $\leq 2.2$ GHz)
<b>Cut-Off Frequency:</b>	$f_g$ (3 dB), asym. (Shield) in 50 $\Omega$ System	$> 3$ GHz
<b>Standing Wave Ratio:</b>	VSWR in a 50 $\Omega$ System	Typically 1.1 ( $\leq 2$ GHz)
<b>Permissible HF Power:</b>	$P_{\max}$ at VSWR = xx (50 $\Omega$ System)	700 W (VSWR = 1.1) 200 W (VSWR = $\infty$ )
<b>Capacitance:</b>	(Core-Earth) Asymmetric (Shield)	Typically 1.5 pF Typically 1.5 pF
<b>Surge Current Resistance:</b>	(Core-Earth)	C1 - 1 kV/500 A C2 - 10 kV/5 kA C3 - 100 A D1 - 2.5 kA
<b>Ambient Temperature:</b>	(During Operation)	-40 $^{\circ}$ C ... 80 $^{\circ}$ C
<b>Supported Altitude:</b>		$\leq 2000$ m (above sea level)
<b>IP Rating:</b>		IP55
<b>Housing Material:</b>		Nickel-Plated Brass Colored Nickel
<b>Dimensions:</b>		Height 25 mm, Width 25 mm, Depth 67 mm
<b>Connection Type:</b>	IN OUT	Type-N Connector 50 $\Omega$ Type-N Connector, Female Type-N Connector, Female
<b>Standards/Regulations:</b>		IEC 61643-21 2000 + A1:2008 EN 61643-21 2001 + A1:2009

The original product page of the supplier (see link) of the CN-UB-280DC-BB surge protector is the source of the specifications above. Please refer to the manufacturer's product page at the following link for detailed specifications as well as a variety of product-specific documents:

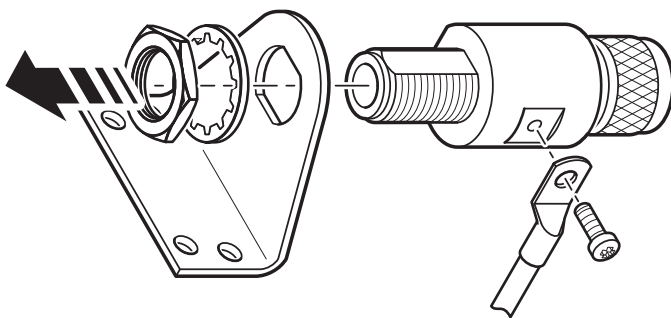
<https://www.phoenixcontact.com/online/portal/gb/?uri=pxc-oc-itemdetail:pid=2818850>



### 5.3.1 MBG S-PRO: Physical Dimensions



### 5.3.2 Installation and Grounding



## 6 RoHS and WEEE

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

We hereby declare that this product is compliant with the European Union 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), polybrominated diphenyl ethers (PBDEs), bis(2-ethylhexyl)phthalat (DEHP), benzyl butyl phthalate (BBP), dibutyl phthalate (DBP), or diisobutyl phthalate (DIBP) above the legal limits.



### WEEE status of the product

This product is handled as a B2B (Business to Business) category product. To ensure that the product is disposed of in a WEEE-compliant fashion, it must be returned to the manufacturer. Any transportation expenses for returning this product (at end-of-life) must be covered by the end user, while Meinberg will bear the costs for the waste disposal itself.



