



The Synchronization Experts.



MANUAL

GNSS MULTI BAND Antenna

Antenna / Converter Unit

May 11, 2022

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!

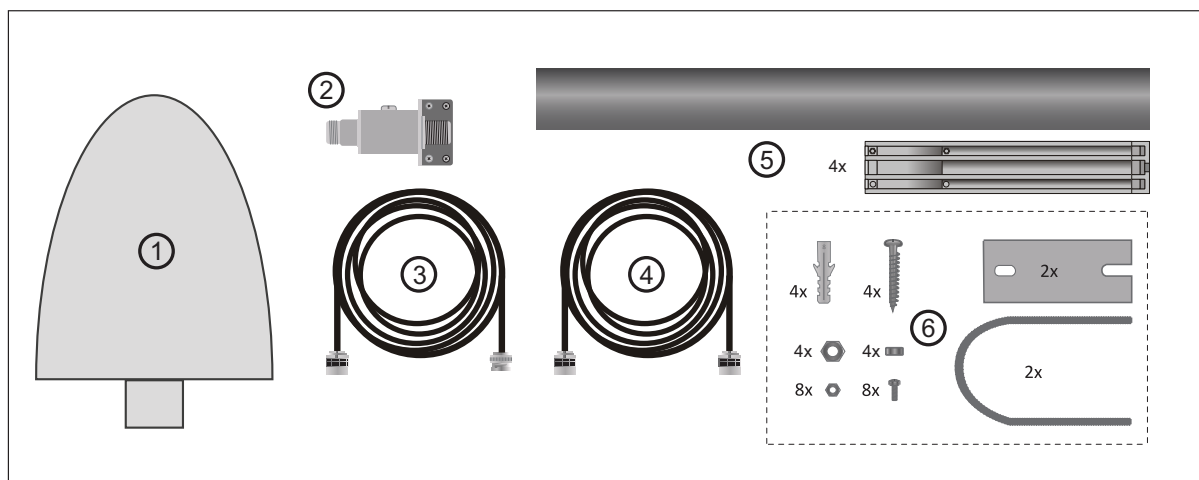
Do not carry out any installation or maintenance work on the antenna system or cabling when there is a potential risk of lightning.

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 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 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:

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 GNSS Multiband 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:

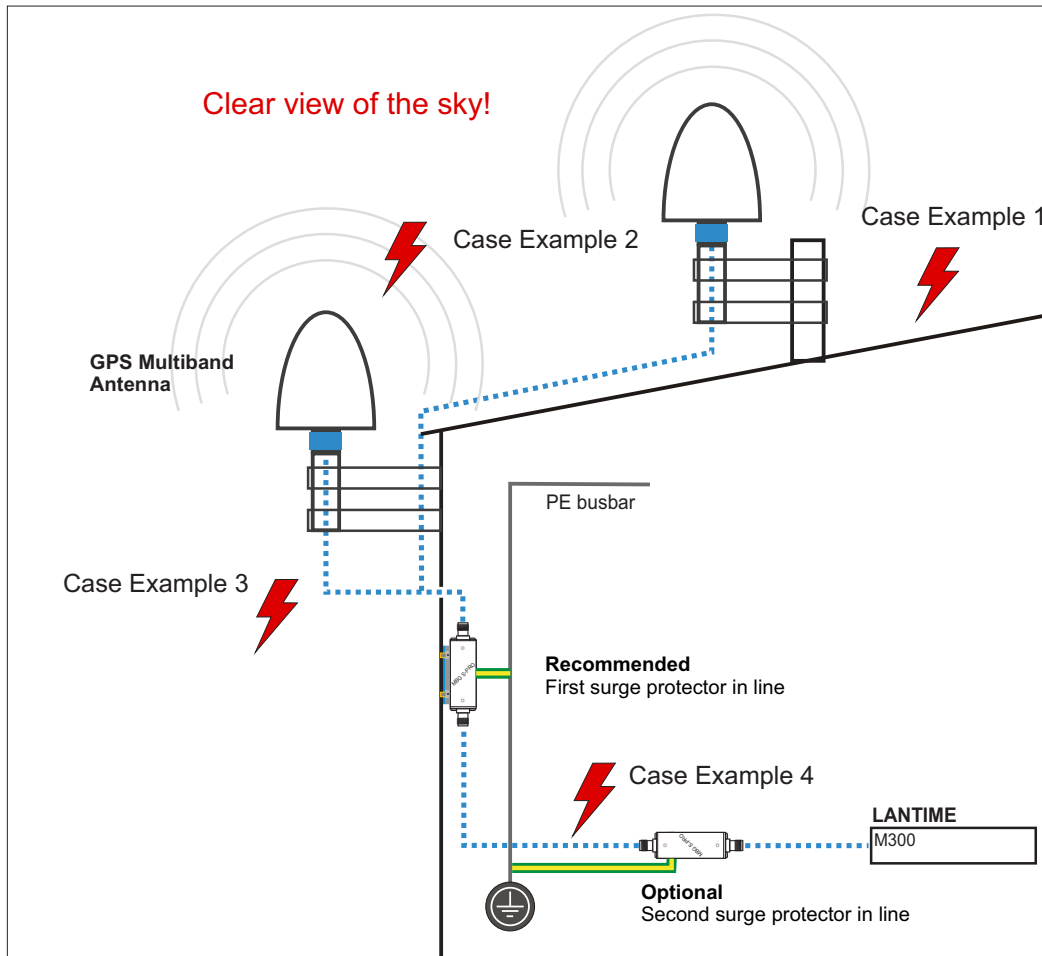
- clear view of 8° above the horizon or
- clear view towards equator (if clear view of 8° not possible) or
- clear view between 55th north and 55th south parallels (satellite orbits).



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

Important Information Regarding Surge Protection

The following illustration is a visual representation of where there is a risk of hazardous voltage surges in the cable route (from antenna to Meinberg system). The examples below explain how you can protect your Meinberg system from these.



Case Example 1:

An indirect lightning strike near the antenna or coaxial cable may induce transient voltages ("spikes" or "surges"). These spikes can be carried via the coaxial cable to the inside of the building and consequently to the system's receiver. It is therefore strongly recommended to have the surge protector installed at the point directly after the cable enters the building.

Case Example 2:

In the event of a direct lightning strike on the antenna, the resultant transient voltage may be discharged via the PE busbar (Multi GNSS L1 antenna only). This prevents the transient voltage from being carried to the coaxial cable and subsequently to the system's receiver.

Case Example 3:

If the length of the coaxial cable between the antenna and point of entry into the building is rather long (e.g., 10 meters), there is a greater risk of transient voltages being introduced into the antenna cable as a result of lightning strike. So the installation of a surge protector immediately after the point of entry into the building is also strongly recommended here.

Case Example 4:

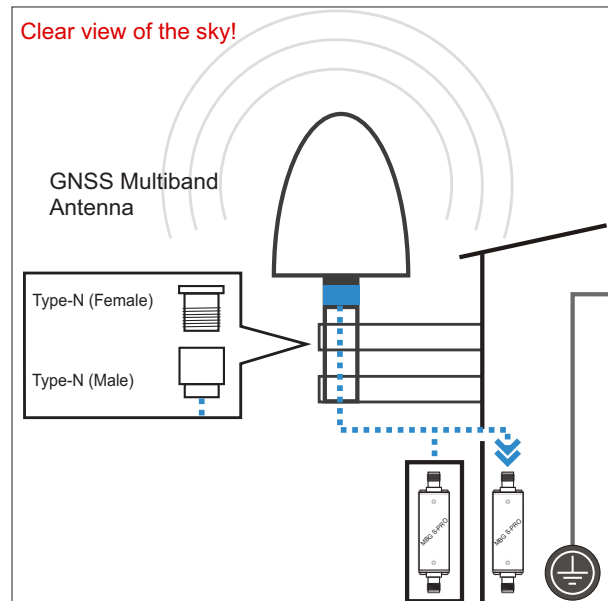
If the cable leading from the point of entry into the building to the Meinberg system is laid together with other cables (for example in a cable duct alongside high-voltage cables), transient voltages may "leak" into the antenna cable, causing damage to your system. To prevent this, a second surge protector can optionally be installed in the line just before the device.

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. Feed the other end of the cable into the building through the wall.



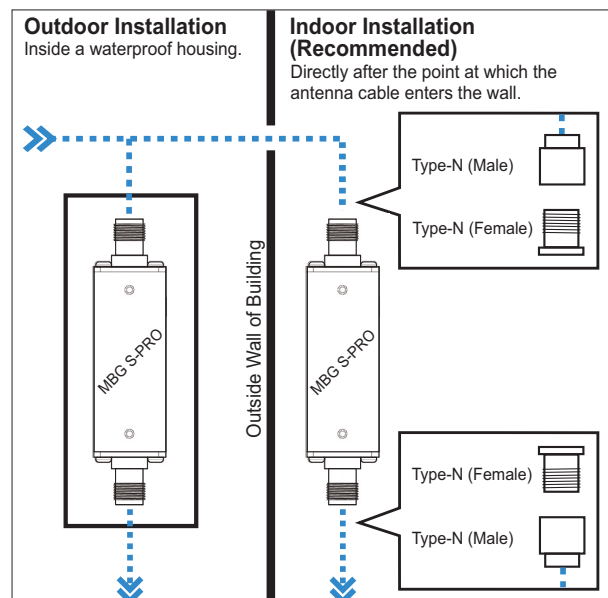
Make sure that the maximum cable length is not exceeded when installing the antenna cable between the antenna and receiver. The maximum length will depend on the type of cable used (H-155, RG 58U) and its attenuation factor.

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).

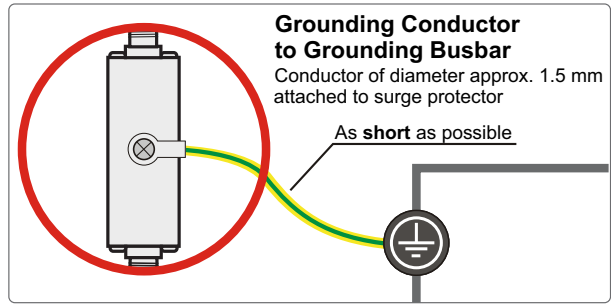
Connect the other end of the antenna cable to the female connector of the surge protector.



3.

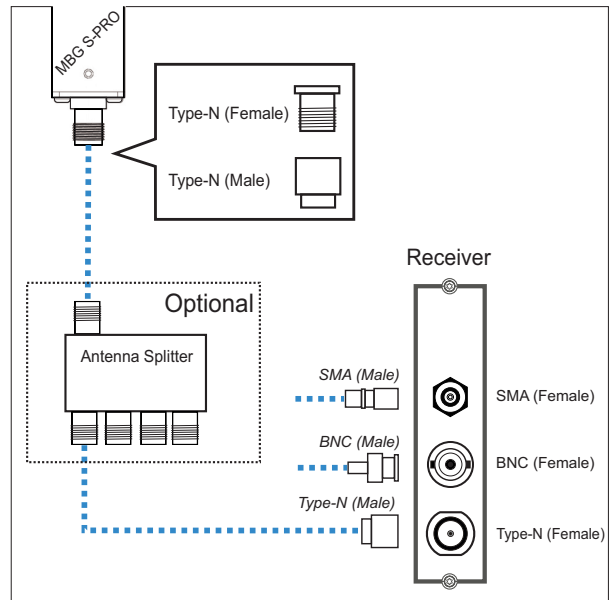
To ground the antenna cable, connect the surge protector to a grounding busbar using a grounding conductor (see illustration).

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.

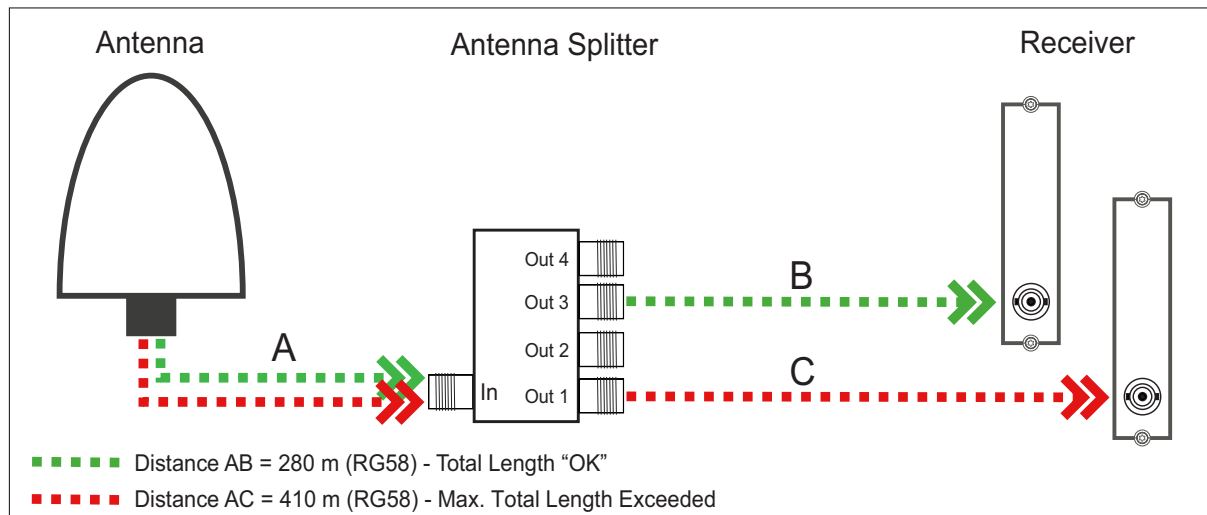


Optional Antenna Splitter

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.



Please note for installation purposes that GNSS L1 components cannot be directly connected to or used with a Meinberg GPS antenna distributor.



Compensating for Signal Propagation Delay in the Antenna Cable

Die Signal-Übertragungszeit des Satellitensignals wird durch die Länge des Kabels beeinflusst und kann beim Empfänger eine Verzögerungszeit des Signals hervorrufen.

Damit die angeschlossene Referenzuhr die Signallaufzeit des Antennenkabels kompensieren kann, müssen Sie entweder die Länge des Antennenkabels in Metern oder die Kompensationszeit in Nanosekunden in den Einstellungen Ihrer Referenzuhr angeben.

Loggen Sie sich dazu im Webinterface Ihres LANTIME-Systems ein und gehen wie folgt vor:

1. Öffnen Sie das Menü "Uhr" → "Status & Konfiguration"
2. Wählen Sie das entsprechende Uhrenmodul aus
3. Klicken Sie auf den Reiter "Verschiedenes"
4. Wählen Sie die Methode aus und tragen den entsprechenden Wert ein.

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.

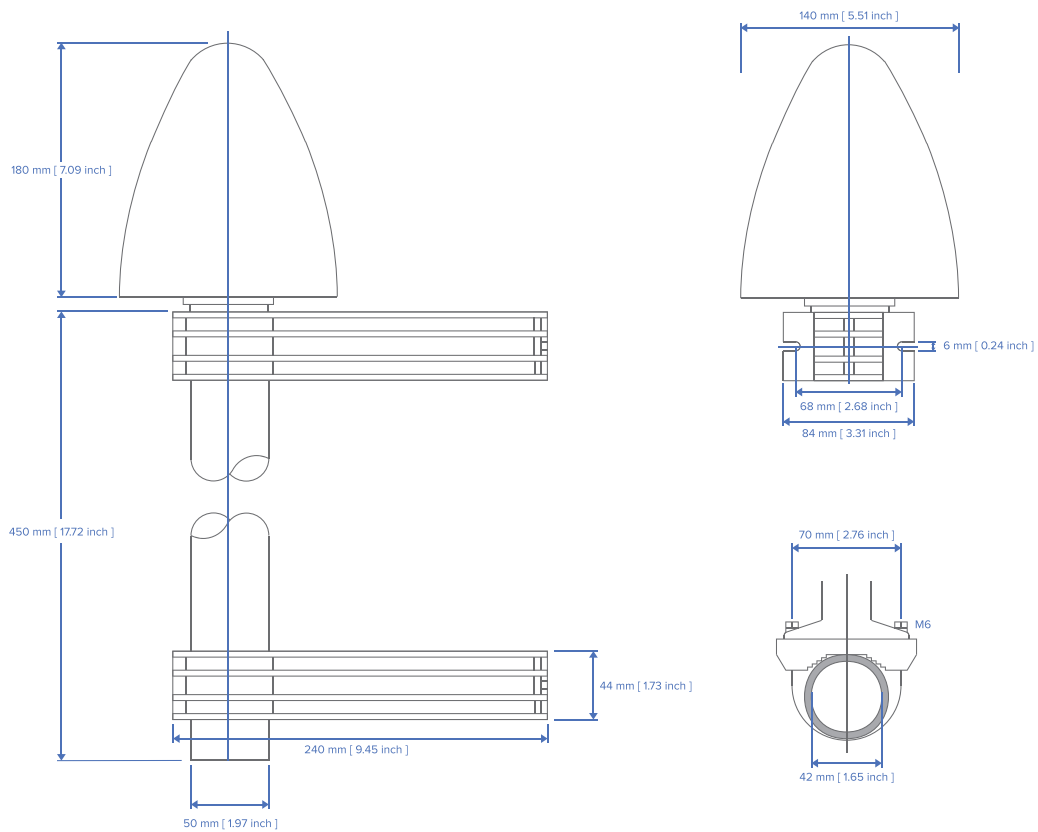
Cable	Delay	Usage
RG 58U	5 ns/m	For GPS and GNS-UC receivers
H-155	4 ns/m	For GNS and GNM receivers

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

Out-of-band rejection:

Freq. Band E5/L2/G2	Frequency	Gain
	< 1050 MHz	> 45 dB
	< 1125 MHz	> 30 dB
	< 1350 MHz	> 45 dB
Freq. Band L1/E1/B1/G1	Frequency	Gain
	< 1450 MHz	> 30 dB
	< 1690 MHz	> 30 dB
	< 1730 MHz	> 40 dB

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 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

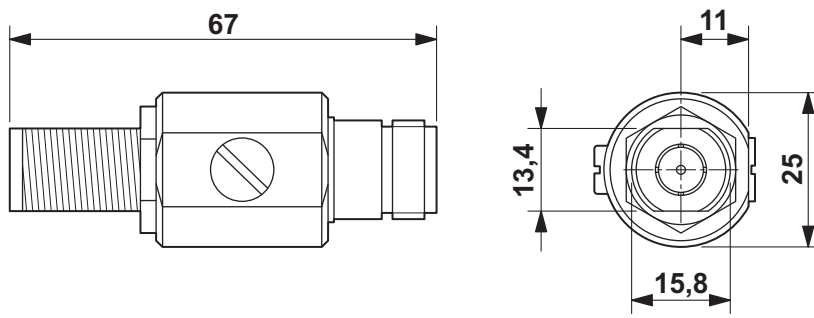
Installation Method:	Connector Type-Specific Adapter Plug	
Direction of Action:	Line Shield/Earth Ground	
Maximum Continuous Operating Voltage:	UC (Wire-Ground) 195 V AC	280 V DC
Rated Current:	I_N	5 A (25 °C)
Effective Operating Current:	I_C at UC	$\leq 1 \mu\text{A}$
Rated Discharge Current:	I_n (8/20) μs (Core-Earth) I_n (8/20) μs (Core-Shield)	20 kA 20 kA
Total Surge Current:	(8/20) μs (10/350) μs	20 kA 2.5 kA

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

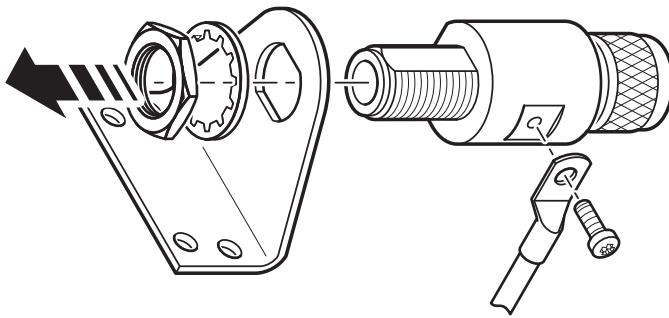
The original product page of the supplier (see link) of the CN-UB-280DC-BB surge protector is the source of the specifications above. Please refer to the manufacturer's product page at the following link for detailed specifications as well as a variety of product-specific documents:

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

5.1.1 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 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.



7 Declaration of Conformity

Konformitätserklärung

Doc ID: GNSS Multiband Antenna-May 11, 2022

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 Multiband 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:

EMV – Richtlinie <i>EMC Directive</i>	DIN EN 61000-6-2:2019 DIN EN 61000-6-3:2007 + A1:2011 DIN EN 55032:2015
2014/30/EU	DIN EN 55024:2010 + A1:2015

Niederspannungsrichtlinie <i>Low-voltage Directive</i>	DIN EN 62368-1:2014 + A11:2017
2014/35/EU	

RoHS – Richtlinie <i>RoHS Directive</i>	DIN EN IEC 63000:2018
2011/65/EU + 2015/863/EU	

Bad Pyrmont, May 11, 2022


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