The Synchronization Experts.

MANUAL

IMS-GNM181 Setup Guide

Hot-Plug Module

Meinberg Funkuhren GmbH & Co. KG

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1 Imprint & Legal Information

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2 Introduction

This Setup Guide is a systematically structured guide which supports you during the initial setup of your Meinberg product. The individual chapters also describe general functions, installation and essential technical data. The Setup Guide also explains the most important parameters which have to be configured in the respective management program for a quick startup of your product.

The LTOS7 manual provides a complete description of all configurations and status monitoring options of your Meinberg product.

Download link: https://www.meinbergglobal.com/download/docs/manuals/english/ltos_7-00.pdf

3 Safety Instructions for hot pluggable Modules

Check before every maintenance work on the system:

- If a data backup is required?
- Is a backup required, verify the data recovery which is done by this backup.
- Make sure to avoid any static discharge while working - use a grounding cable and/or antistatic gloves during installation and removal of hot pluggable components.
- If you are replacing a hot pluggable power supply, unplug the power cable prior to removing the module from the case.
- Never open a power supply. In power supplies dangerous voltages can still remain even after disconnection from the power supply. Always send power supplies back to the manufacturer for maintenance.

Exchange of hot-swap components

- Ensure that components which will be replaced during operation, always be treated with the utmost care. Avoid contact with live components.
- Electrostatic discharge can damage electronic components. For this reason, ensure protection against electrostatic discharges by wearing anti-static shoes while working with the system.
- Take care when removing and installing the hot-plug modules. Always work with the utmost caution. Touch the modules only at the edges.
- Place the module out of the box or after removal from the system with the component side to the top on a grounded and static-free surface.
- Storage of an IMS module must be done in a dry place.
- Installation or removal from hot-swap components only by authorized personnel!

3.1 Additional Safety Information

This manual contains important safety information regarding the installation and use of the device. Please read it through fully before setting up the device for use.

This device may only be used for the purpose described in this manual. In particular, the specified operating limits of the device must be heeded. The person setting up the device is responsible for safety matters in relation to any larger system in which the device is installed!

Failure to observe these instructions may have an adverse impact on device safety!

Please keep this manual in a safe and accessible place.

Target Readership
This manual is only intended to be used by qualified electricians, or by persons who have been appropriately instructed by qualified electricians and who are familiar with applicable national standards and safety rules & regulations, especially in relation to the installation of low-voltage (< 1000 V) installations.

3.2 Cabling

WARNING!

Danger of death from electric shock! Never work on cables while the power is live!
Always disconnect the cables from the devices at **both** ends before working on the plugs and terminals of connected cables!

3.3 Prevention of ESD Damage

ATTENTION!

An ESDS device (electrostatic discharge-sensitive device) is any device at risk of damage or malfunction due to electrostatic discharges (ESD) and thus requires special measures to prevent such damage or malfunction. Systems and modules with ESDS devices usually bear the following symbol:

Symbol Indicating Devices with ESDS Components

The following measures will help to protect ESDS components from damage and malfunction.

When preparing to dismantle or install devices:
Ground your body (for example, by touching a grounded object) before touching sensitive devices.

Ensure that you wear a grounding strap on your wrist when handling such devices. These straps must in turn be attached to an uncoated, non-conductive metal part of the system.

Use only tools and devices that are free of static electricity.

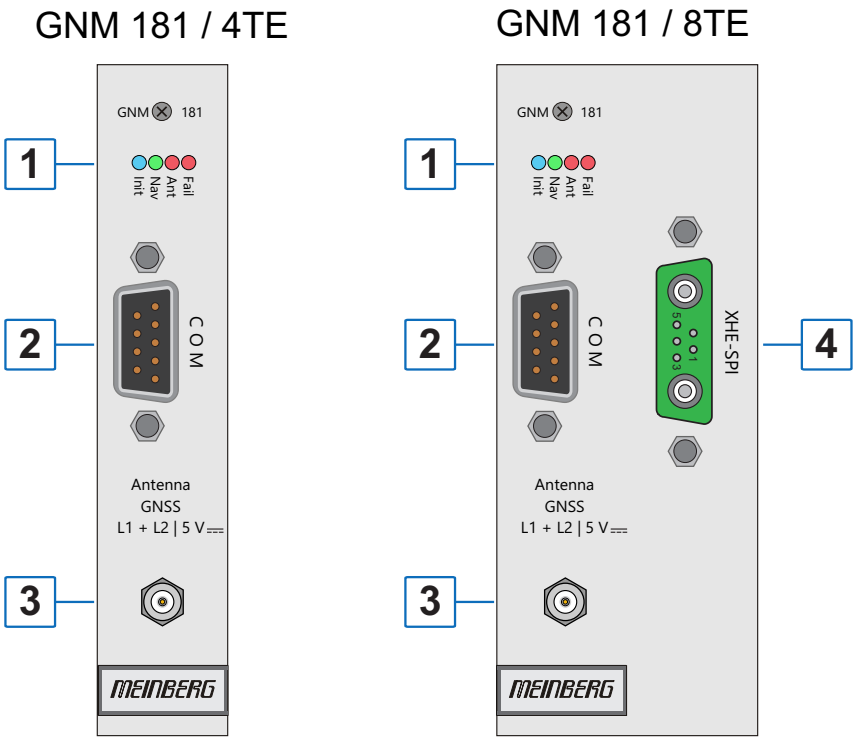
When transporting devices:
Devices must only be touched or held by the edges. Never touch any pins or conductors on the device.

When dismantling or installing devices:
Avoid coming into contact with persons who are not grounded. Such contact may compromise your connection with the earth conductor and thus also compromise the device's protection from any static charges you may be carrying.

When storing devices:
Always store devices in ESD-proof ("antistatic") bags. These bags must not be damaged in any way. ESD-proof bags that are crumpled or have holes cannot provide effective protection against electrostatic discharges.

ESD-proof bags must have a sufficient electrical resistance and must not be made of conductive metals if the device has a lithium battery fitted on it.

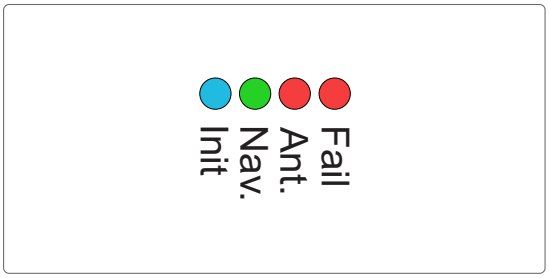
4 Front Connectors GNM181 GNSS Multi Band Receiver



4.1 Status LEDs GNM 181

LED Indicators

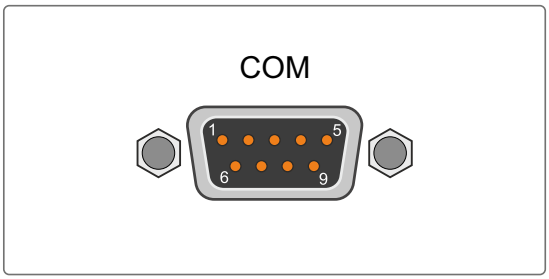
Init	blue:	while the receiver passes through the initialization phase
	green:	the oscillator has warmed up
Nav.	green:	positioning successfully
Ant	red:	antenna faulty or not connected
	yellow:	the clock is synchronized by an external Signal - MRS mode (PPS, IRIG ...)
Fail	red:	time has not synchronized



4.2 Multiref COM 0

The COM 0 interface of the GNM 181 is used for serial communication (RS-232 signal level). It can also be used as an optional "Multiref" interface for the reference signal PPS + String.

Assignment:
Pin 2: RxD (receive)
Pin 3: TxD (transmit)
Pin 5: GND (ground)



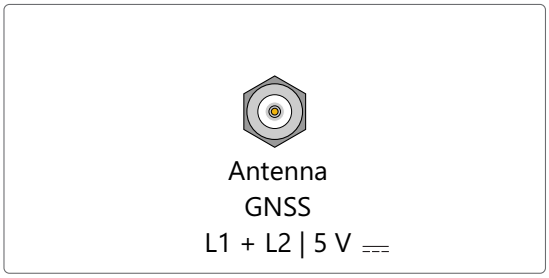
Reference signal via 9-pin DSUB connector (PPS + String Mode)

Pin 1: PPS
Pin 2: String *

* The following timestrings (time telegrams) can be used:
NMEA RMC
NMEA ZDA
Meinberg Standard
Uni Erlangen

4.3 GNM181 Multi Band Receiver

Receiver Type: 184-Channel Receiver
GPS/GLONASS/Galileo/BeiDou



Signal Support:

GPS:	L1 C/A (1575.42 MHz)	
	L2C (1227.60 MHz)	
Galileo:	E1-B/C (1575.42 MHz)	
	E5b (1207.140 MHz)	
BeiDou:	B1I (1561.098 MHz)	
	B2I (1207.140 MHz)	
GLONASS:	L1OF (1602 MHz + k*562.5 kHz)	
	L2OF (1246 MHz + k*437.5 kHz)	

where k represents the channel number (in the range -7 to 6) within the corresponding GLONASS frequency band

Accuracy of Pulses: Dependent on oscillator option:
< +-50ns (OCXO-SQ, -MQ, -HQ)
< +-20ns (OCXO-DHQ)

Synchronization Time: < 1 minute in Normal Operation mode, approx.
1 minute after Cold Boot (12 minutes in GPS-only mode)

Signal Gain 40 dB

Antenna Gain: ≥ 3.5 dBic / ≥ 3 dBic

Power Supply 5 V DC (via Antenna Cable)

Nominal Impedance: 50 Ohm

Connection Type: SMA Female / Antenna

Cable: Coaxial Cable, Shielded (Belden H155)
Cable length: Up to max. 70 m possible

Backup Battery Type: CR2032 button cell lithium battery.
The device provides a battery-backed hardware clock and battery-backed RAM storage for the almanac data. In the event of a failure of the main power supply, the hardware clock will enter free-run mode, running off the internal oscillator, and the almanac data will be stored in the battery-backed RAM.
Life of lithium battery: At least 10 years

Danger!

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.

4.4 XHE-SPI Connector

Important!

- This connector must only be used to connect a Meinberg IMS-XHE^{Rb} Rubidium expansion unit. The use of this port to connect other devices is not supported and may invalidate the warranty of your LANTIME system and your IMS-GNM181 module.
- Do not connect your IMS-XHE^{Rb} Rubidium expansion unit to the LANTIME system while the LANTIME system or Rubidium unit is operational. Both the LANTIME system and IMS-XHE^{Rb} Rubidium expansion unit must be powered down and isolated from their power sources before the IMS-XHE^{Rb} Rubidium expansion unit can be connected.

Supported Device: Meinberg IMS-XHE^{Rb}
Rubidium Expansion Unit

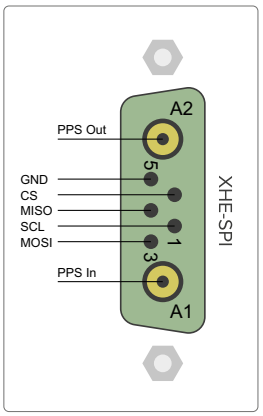
Connector Type: XHE-SPI

Cable Type: XHE-RB Cable

Pin Assignment:

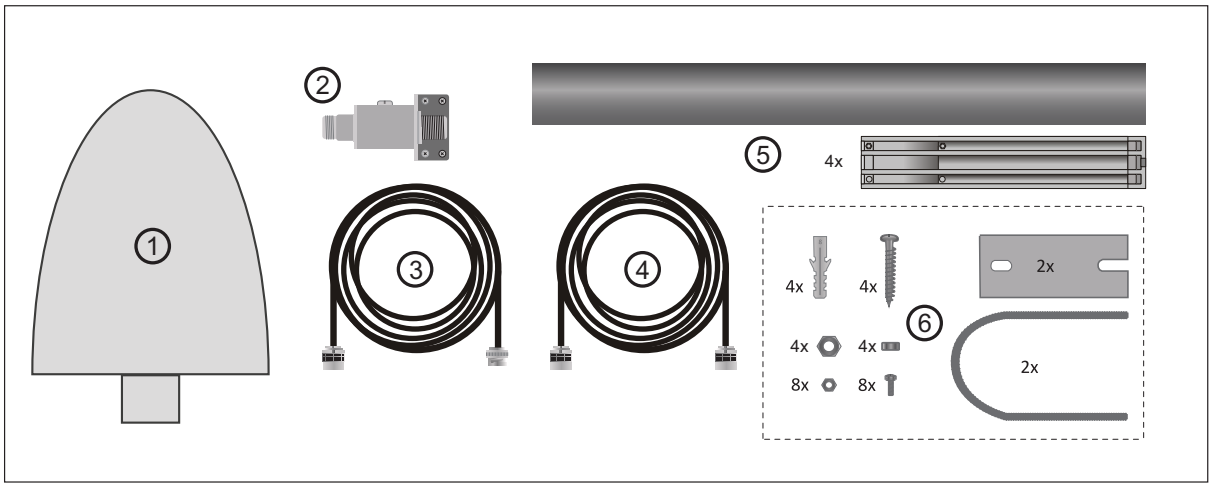
A1: PPS In
A2: PPS Out

Pin 1: SCL_Out (SPI Clock)
Pin 2: CS (Chip Select)
Pin 3: MOSI (Master Out, Slave In)
Pin 4: MISO (Master In, Slave Out)
Pin 5: GND



5 Before you start

5.1 Scope of delivery



Included in delivery of a Meinberg GNM181 receiver module:

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.

5.2 Disposal of Packaging Materials

The packaging materials we use are fully recyclable:

Material	Used for	Disposal
Cardboard	Shipping, packaging of accessories	Paper recycling
Plastic Wrapping	Shipping, packaging of accessories	Household waste or recycling depot

6 System Installation

6.1 Important Information Regarding Hot-Pluggable IMS Modules

The following information should be strictly observed when replacing IMS modules during operation. Not all IMS modules are fully hot-pluggable. For example, it is naturally not possible to replace a power supply unit in a system without PSU redundancy without first having installed a second power supply unit while the system is in operation.

The following rules apply for the individual IMS slots:

PWR Slot:	"Hot-Swappable"	If you operate your system with only one power supply unit, a second power supply unit must be installed before removing or replacing it in order to keep your system operational.
I/O, ESI, and MRI Slots:	"Hot-Pluggable"	
CLK1, CLK2 Slots:	"Hot-Pluggable"	When a clock module is replaced or installed, it is important to rescan the reference clocks ("**Rescan Refclocks**") in the "**System**" menu of the Web Interface.
RSC/SPT Slots:	"Hot-Pluggable"	It will not be possible for your IMS system to switch between signal generators while the RSC/SPT is not installed.
CPU Slot:	"Not Hot-Pluggable"	Before the CPU is removed, the IMS system must be powered down. Please note that after powering on and rebooting LTOS, the configuration of some IMS modules may be reset to factory defaults!

Information:

The NTP service and access to the Web Interface will be unavailable while the CPU is not installed. Management and monitoring functions will also be disabled.

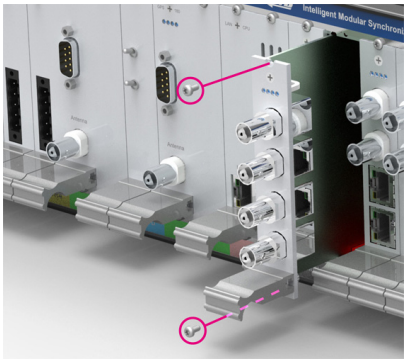
6.2 Installation and Removal of Hot-Pluggable IMS Modules

A Torx screwdriver is required (T8 x 60) to remove and install IMS modules.

Important!

Take note of the safety information provided in → Chapter ??, "??"!

Removing a Module



Locations of fixture screws in a 3U IMS system

Locations of fixture screws in a 1U IMS system

1. Remove the two marked Torx screws from the module faceplate.

2. Pull the module **carefully** out of the guide rail. Note that the module will be securely seated in the connector block inside the chassis—a certain amount of force must be applied to release the module. Once the module has been detached from the connector block on the system backplane, the module can be easily pulled out.

3. If the removed module is not to be replaced with another module, a suitable one-slot or two-slot 'placeholder' faceplate should be fitted using the two Torx screws in order to cover this space.

Installing a Module

1. To replace a module, remove the installed module in accordance with the guide "**Removing a Module**" on the previous page. Otherwise, remove the two Torx screws from the cover plate of the unused slot. We recommend keeping the cover plate in a safe place for later use.

2. Insert the module correctly into the two guide rails of the system chassis. If it cannot be inserted with reasonably minimal effort, it is possible that the module is not properly seated in the guide rails. In this case, you should pull the module out and try again. **Do not use excessive force when pushing the module in!** Failure to heed this instruction may result in damage to the module and/or chassis.

3. Once the module has reached the connector block of the system backplane, a little more effort will be required to insert the module into the connector block. Ensure that the module is locked securely into place and that the faceplate of the module is flush with that of the adjacent modules or cover plates.

4. Insert and tighten the two Torx screws with a **max. torque of 0.6 Nm**.

The installed module is now ready to be set up for use.

6.3 Connecting the System

Make sure that all required interfaces of the module are connected. If your PC/laptop only provides USB ports, a serial/USB adapter is required when establishing a serial connection between COM 0 (clock) and serial port (laptop).

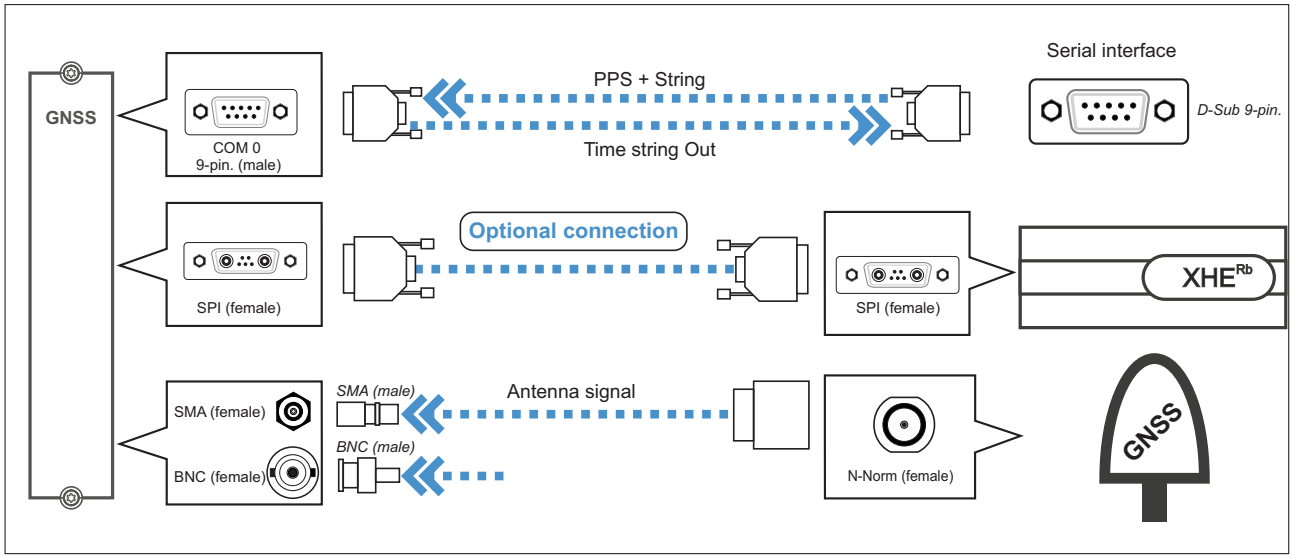


Figure: Connection scheme of the module

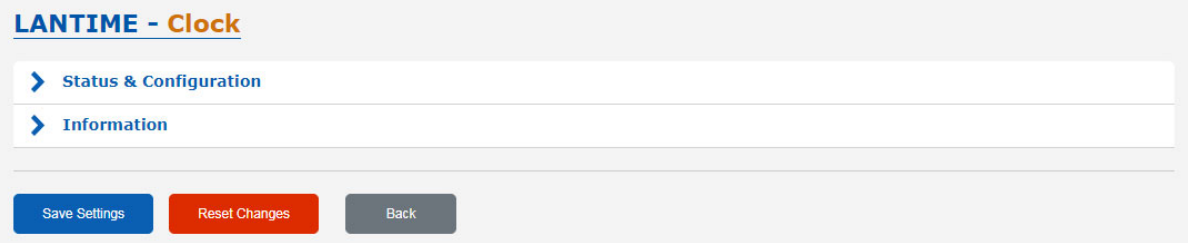
The following section describes how you can initially put a clock module into operation by using the Web Interface.

7 Configuration of GNSS Receiver

This chapter explains how to put an IMS-GNSS receiver into operation via the web interface and also via the front panel (if available).

7.1 Clock

On this page of the web interface, configurations can be made on the respective installed reference clocks or the changeover card.

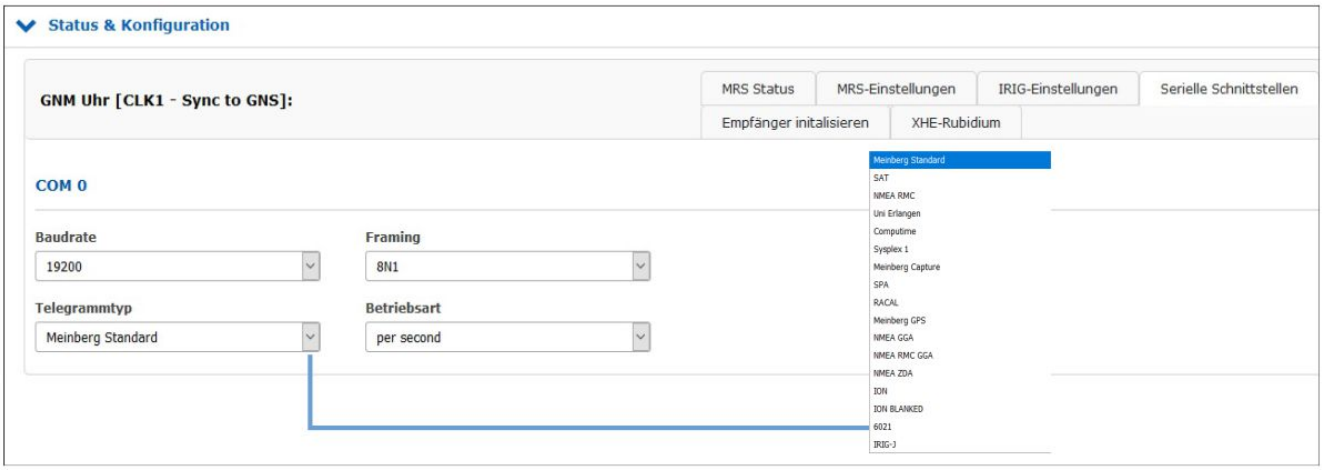


Depending on the design of the system, which means whether it is a single reference clock or a system with two installed remote clocks and a changeover card, the web interface builds up accordingly. This also applies to the type of reference clock and its options. In case of a redundant receiver configuration the common settings for "IRIG In/Out", "Serial Ports", "Time Zone", "Enable Outputs", "Programmable Pulses" and "Synthesizers" appears into the "Switch Card" menu.

Figure: Menu "Clock" in case of a single receiver

7.1.1 Serial Interfaces

Depending on the number and version of the system, the parameters for the serial interfaces can be configured in this menu.



Baudrate: The speed with which the serial telegram is to be transmitted:
300, 600, 1200, 2400, 4800, 9600, 19200

Framing: Structure of the telegram:
7E1, 7E2, 7N2, 7O1, 7O2, 8E1, 8E2, 8N1, 8N2, 8O1

String Type: Meinberg Standard, SAT, NMEA RMC, Uni Erlangen, Computime, Sysplex 1, Meinberg Capture, SPA, RACAL, Meinberg GPS, NMEA GGA, NMEA RMC GGA, NMEA ZDA, ION, 6021, IRIG-J

Mode: You can configure an interval (per second, per minute, on request "?" Only) for the outgoing time string. If the operating mode is set on "Request", a connected client must send a "?" to receive the time telegram in response.

Features:

MRS PPS Plus String
If the system has the MRS "PPS plus string" option, the baudrate and framing for the incoming time string must be configured via this submenu.

Meinberg Capture *only for specific units*
This option is for systems that have a cap input. The event is triggered by a negative edge.

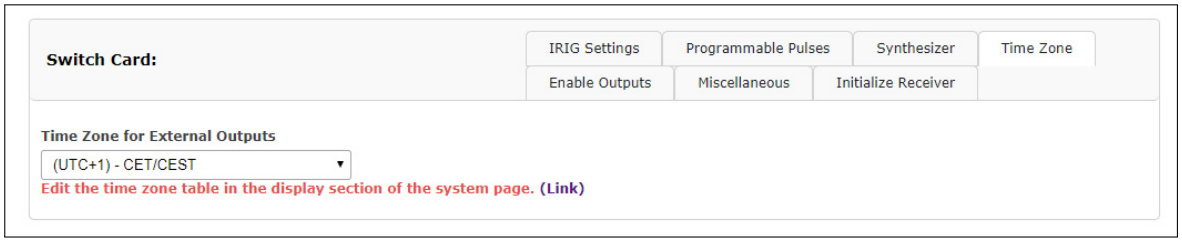
Two operating modes are available for the output of the capture time stamps, "on request ? Only" and "automatically".

on request "?" only
The triggered events are stored in a buffer of the reference clock. As soon as a "?" is sent to the reference clock via a serial connection, the stored events are transferred from the buffer.

automatically
In this mode, the capture events are output directly on the serial interface.

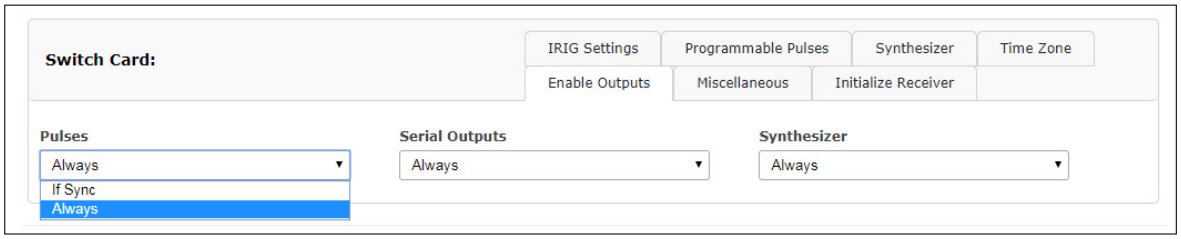
7.1.2 Time Zone

In this menu, you can configure the time zones (offsets) for the output signals (IRIG, serial interface, programmable pulses) of the reference clock.



The data of the time zone are used from the time zone table (see chapter ?? System → Display).

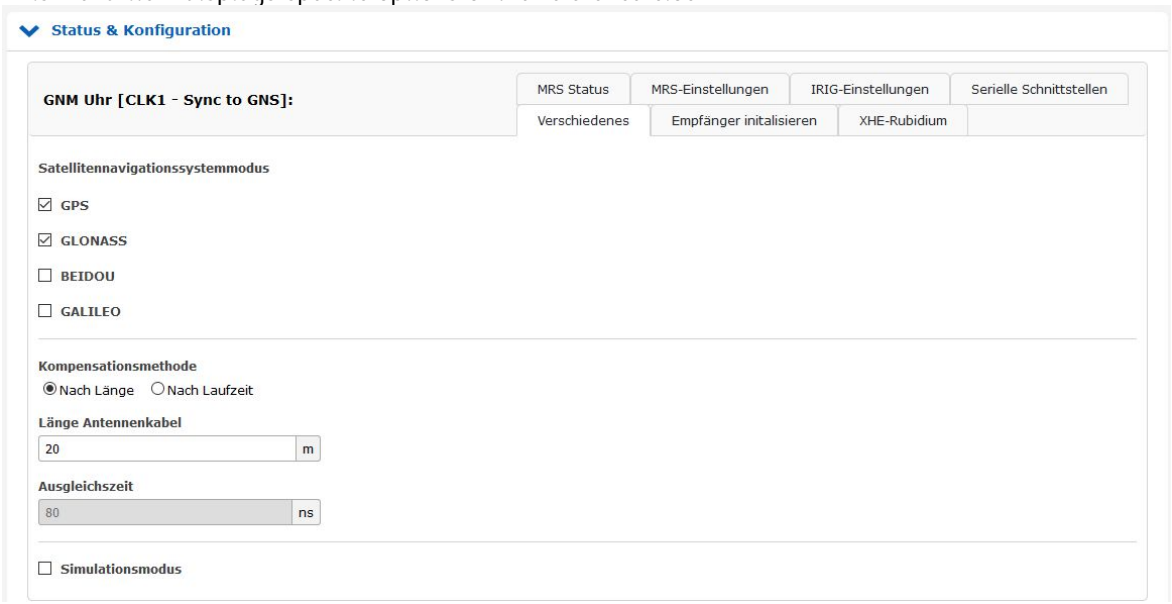
7.1.3 Enabling the Outputs



Optionally, the outputs of the reference clock can be set to always supply a signal when the device is switched on, or only when the internal clock is running synchronously.

7.1.4 Miscellaneous

This menu item displays specific options of the reference clock.



Antenna Cable Length (m):
The receiving satellite signal is delayed by the used coaxial cable.

Cable	Delay	Usage
RG58U	5ns/m	for GPS180 and GNS-UC
H155	4ns/m	for GNS180 and GNM

By entering the cable length (from antenna to receiver), the system calculates the delay time and compensates it automatically. The default value is 20m and the maximum input value is 500m, which must not be exceeded.

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.

Simulation Mode:
This menu allows the user to operate the time server without an antenna. Normally, the NTPD loses synchronization when the antenna or the external reference source is disconnected (red FAIL LED is turned on). By activating the simulation mode, the corresponding status information for the NTPD is permanently set to SYNC. This also makes it possible to transmit other times, which have been entered via the menu item "Initialize the receiver", to the NTPD. In normal cases, the checkbox should remain empty. If this box is activated, the status "Simulation mode" is displayed under "Info of the receiver" in the main menu.

GPS Time Scale:

UTC Coordinated Universal Time (including leap seconds which are continuously updated)

GPS since 1st of January 1980 - GPS System Time: monotonous time scale without leap seconds. Includes the leap seconds from 1970-1980.

TAI since the 1st of January 1970 - International Atomic Time: monotonous time scale without leap seconds. Difference to GPS Time: 19 seconds.

If you change the timescale in the drop-down menu a warning message will appear in the browser window.

Please Note:
If the GPS receiver is configured to output GPS or TAI timescale instead of UTC, the distributed time via NTP is not based on UTC then. This is a protocol violation and this time server can't be used to synchronize standard NTP clients which expect UTC time.

Log Satellite Visibility (GPS Receiver):
If this item is activated, a graphic is generated on which the constellation of the visible satellites are displayed.

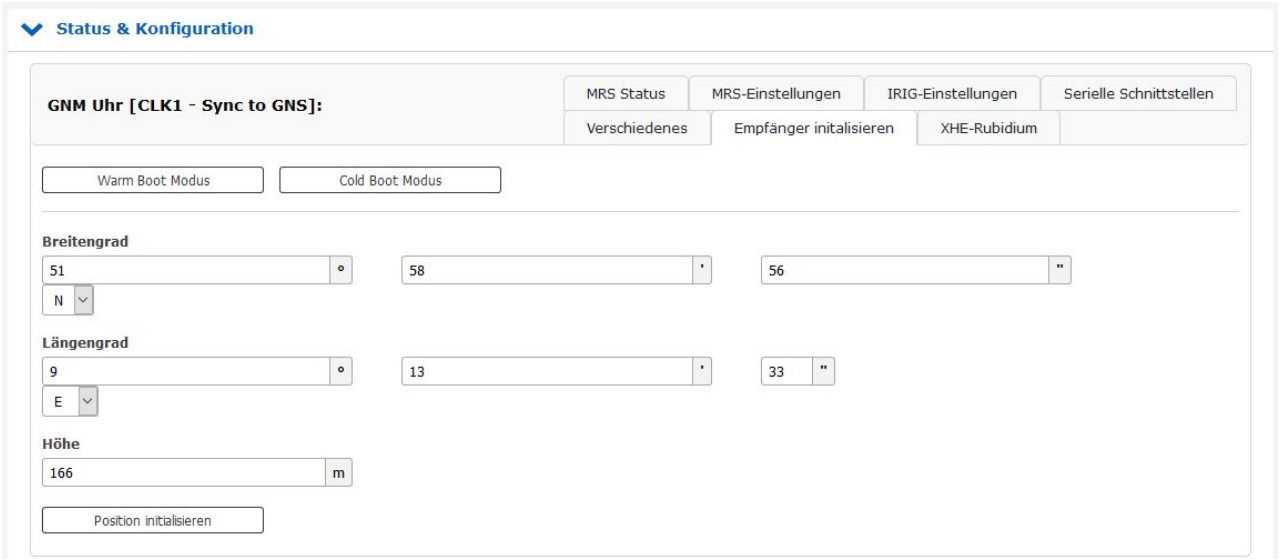
SSM Quality Level in GPS Lock Mode:
If the system has E1 / T1 outputs, the quality level of the SSM can be configured here.

SNS Mode - Satellite Navigation System Mode (GNS Receiver):
If you are using a GNS receiver (GNS or GNS-UC with Up Converter), this drop-down menu allows you to select one or more satellite systems to be used simultaneously.

The following combinations can be selected and received simultaneously:

GNS Receiver	GNS-UC Receiver	GNM-Receiver
GPS only	GPS only	GPS
GLONASS only	Galileo only	GLONASS
Galileo only	GPS/Galileo	Galileo
BeiDou only		BeiDou
GPS/GLONASS		(All available satellite systems can
GPS/Galileo		be received simultaneously)
GPS/BeiDou		
Galileo/GLONASS		
Galileo/BeiDou		
GLONASS/BeiDou		
GPS/Galileo/GLONASS		
GPS/Galileo/BeiDou		

7.1.5 Initialize Receiver



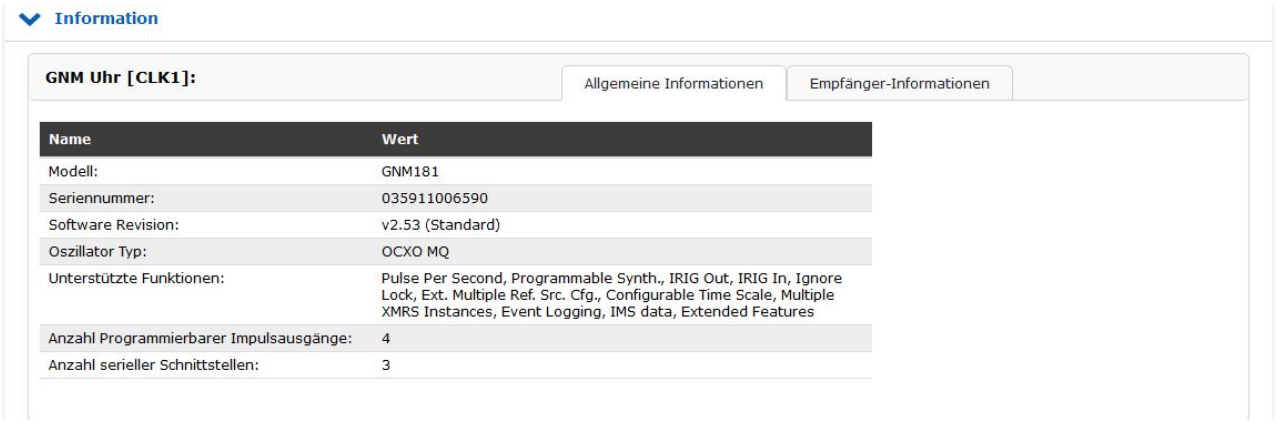
Warm Boot Mode only for GNSS receiver:
This menu allows the user to switch the receiver to WARMBOOT MODE. This may be necessary if the satellite data in the battery-buffered memory is too old, or if the device is operated at a location that is several hundred kilometers away from the last operating location, since the calculation of the visibility of the satellites yields incorrect results.

Cold Boot Modus only for GNSS receiver:
This menu allows the user to reinitialize all GPS system values, this means that all stored satellite data will be deleted. Please note that the receiver takes about 15 minutes to read-in the information of the satellites again, to complete the cold boot!

Coordinates (latitude, longitude, and altitude) *only GNSS receiver:
The absolute position of the GPS antenna can be entered here and can be sent to the GPS reference clock with "initialize Position". This option is useful when the system is operated at a different location and if started with the previously battery-buffered satellite data.

Time/Date:
With this function, the reference clock can manually be set to a specific date and time.

7.1.6 Receiver Information



This menu item lists all the important information and options of the reference clock.

Explanation of GPS Satellite Status "Satellites in View" and "Number of Good Satellites"
Satellites of the GPS and other GNSS systems are usually not stationary, but circle around the globe on well-known tracks, so each individual satellite may be above or below the horizon at a given location and time. Satellites that are below the horizon can't be tracked anyway, so the receiver uses its last known position and almanac data from the satellites to determine which satellites are currently expected to be above the horizon at its geographic position, and can potentially be tracked. All these satellites are called to be **in view**.

However, even some the satellites that are in view may be shielded by buildings, mountains, etc., so the receiver may be unable to track these satellites. Also, individual satellites may be temporarily in maintenance mode, so they must not be used even if they can be tracked. Only satellites that can be tracked and are not in maintenance mode are considered **good** and used to determine the current position and time.

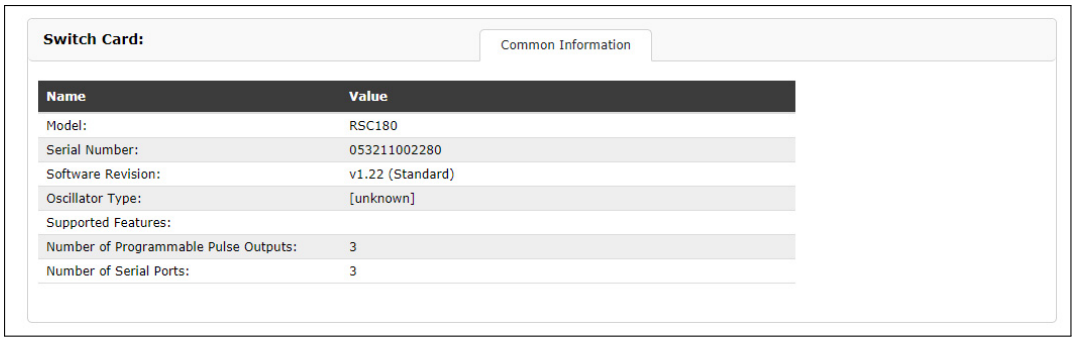
So the number of **good** satellites can never exceed the number of satellites in view, but it can be significantly less if the antenna has been installed in a location with limited view to the sky. In worst case this can lead to limited accuracy, or only temporary synchronization.

7.1.7 Switch Card

The RSC (SCU) switch card is an automatic multiplexer for redundant systems with two Meinberg receivers. The card is used for the automatic switching of the pulse and frequency outputs as well as the serial interfaces of the connected clocks. The selection of the respectively active system is made, based on the state of the clock's generated TIME_SYNC signals, which show the synchronous state of the clocks.

In order to avoid unnecessary switching operations, for example during periodic free running of a system, the order of the active and the reserve system is exchanged at every change-over. For example, if the active system switches to the free running mode while the reserve system is operating synchronously, it is switched over to the synchronous reserve system. A reset to the old state occurs only if the now active system (formerly the reserve system) loses synchronization, while the reserve system (previously active system) operates synchronously. If both systems operate in the free-running mode, no changeover is made and the current state is retained.

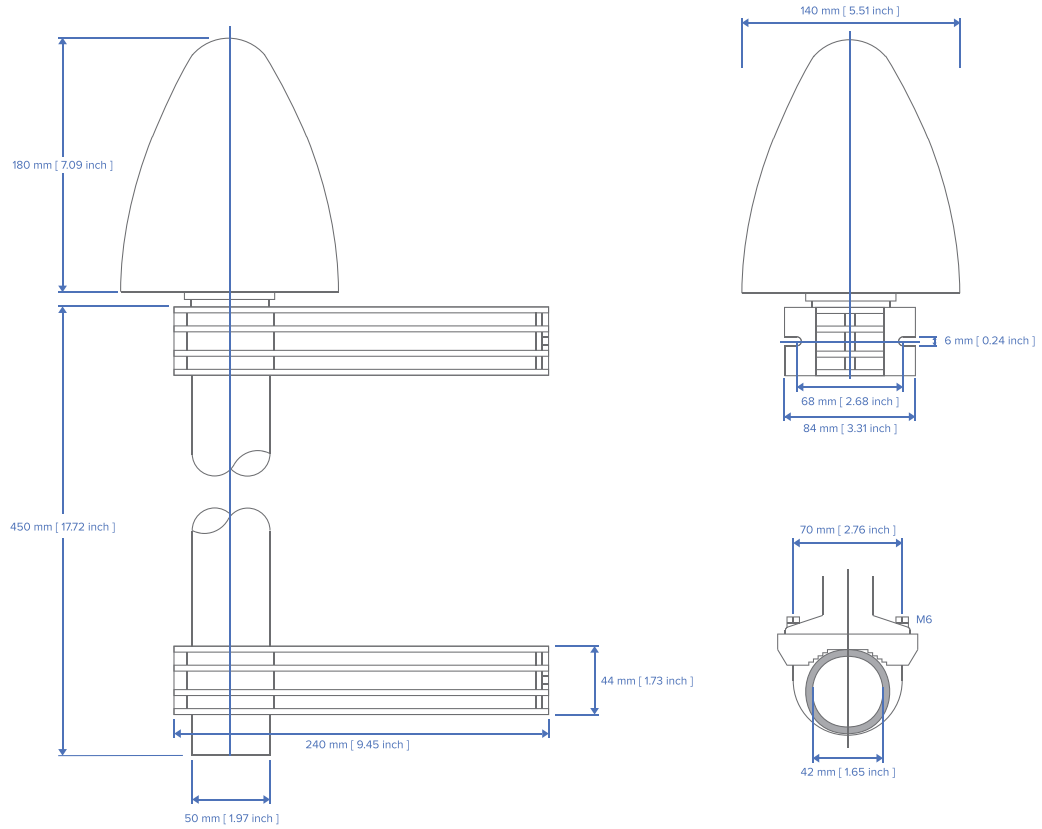
7.1.8 Receiver Information Switch Card



This menu item lists all the important information and options of the switch card.

8 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

8.1 Technical Specifications: MBG-S-PRO Surge Protector

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

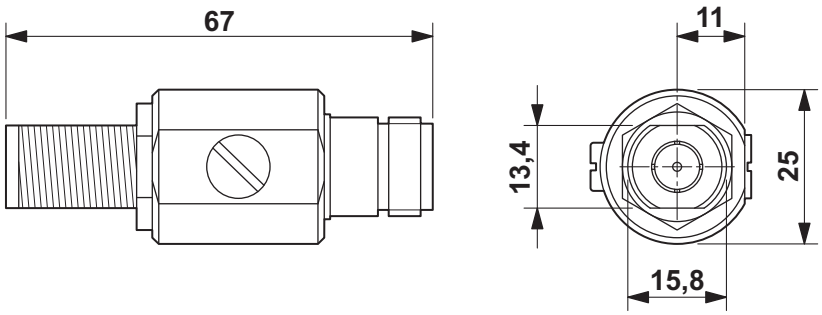
Installation Method:	Connector Type-Specific Adapter Plug	
Direction of Action:	Line Shield/Earth Ground	
Maximum Continuous Operating Voltage:	UC (Wire-Ground) 195 V AC	280 V DC
Rated Current:	I_N	5 A (25 °C)
Effective Operating Current:	IC at UC	$\leq$ 1 μA
Rated Discharge Current:	In (8/20) μs (Core-Earth) In (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)μs Maximum (Core-Shield)	20 kA
Rated Pulse Current:	I_{an} (10/1000)μs (Core-Shield)	100 A
Impulse Discharge Current:	(10/350) μs, Peak Value I_{imp}	2.5 kA
Output Voltage Limit:	At 1 kV/μs (Core-Earth) spike At 1 kV/μs (Core-Earth) spike	$\leq$ 900 V $\leq$ 900 V
Response Time:	tA (Core-Earth) tA (Core-GND)	$\leq$ 100 ns $\leq$ 100 ns
Input Attenuation:	aE, asym.	Typically 0.1 dB ($\leq$ 1.2 GHz) Typically 0.2 dB ($\leq$ 2.2 GHz)
Cut-Off Frequency:	fg (3 dB), asym. (Shield) in 50 Ω System > 3 GHz	
Standing Wave Ratio:	VSWR in a 50 Ω System	Typically 1.1 ($\leq$ 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:	$\leq$ 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	

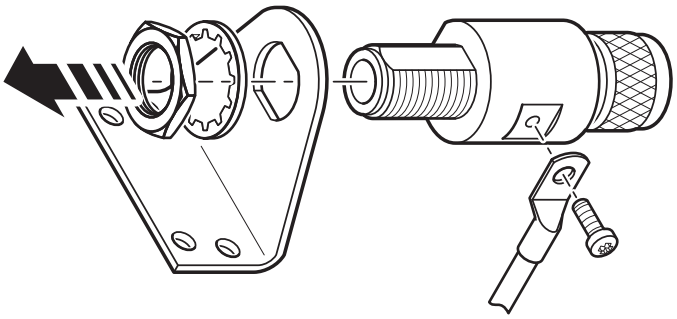
The original product page of the supplier (see link) of the CN-UB-280DC-BB surge protector is the source of the specifications above. Please refer to the manufacturer's product page at the following link for detailed specifications as well as a variety of product-specific documents:

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

8.1.1 MBG S-PRO: Physical Dimensions



8.1.2 Installation and Grounding



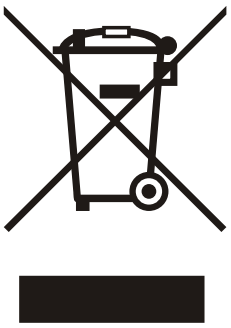
9 RoHS and WEEE

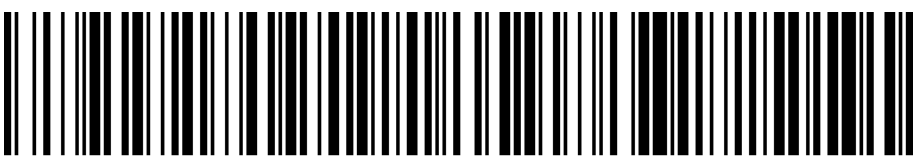
Conformity with EU Directive 2011/65/EU (RoHS)

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" and that no impermissible substances are present in our products pursuant to these Directives. We warrant that our 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 may 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.





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