The Synchronization Experts.

TECHNICAL REFERENCE

microSync

RX412/AD10DC20

February 24, 2023

Meinberg Funkuhren GmbH & Co. KG

Table of Contents

1 Imprint

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3 Presentation Conventions in this Manual

3.1 Conventions for the Presentation of Critical Safety Warnings

Warnings are indicated with the following warning boxes, using the following signal words, colors, and symbols:

Caution!

This signal word indicates a hazard with a **low risk level**. Such a notice refers to a procedure or other action that may result in **minor injury** if not observed or if improperly performed.

Warning!

This signal indicates a hazard with a **medium risk level**. Such a notice refers to a procedure or other action that may result in **serious injury** or even **death** if not observed or if improperly performed.

Danger!

This signal word indicates a hazard with a **high risk level**. Such a notice refers to a procedure or other action that will very likely result in **serious injury** or even **death** if not observed or if improperly performed.

3.2 Secondary Symbols Used in Safety Warnings

Some warning boxes may feature a secondary symbol that emphasizes the defining nature of a hazard or risk.

The presence of an "electrical hazard" symbol is indicative of a risk of electric shock or lightning strike.

The presence of a "fall hazard" symbol is indicative of a risk of falling when performing work at height.

Das Symbol "laser hazard" symbol is indicative of a risk relating to laser radiation.

3.3 Conventions for the Presentation of Other Important Information

Beyond the above safety-related warning boxes, the following warning and information boxes are also used to indicate risks of product damage, data loss, and information security breaches, and also to provide general information for the sake of clarity, convenience, and optimum operation:

Important!

Warnings of risks of product damage, data loss, and also information security risks are indicated with this type of warning box.

Information:

Additional information that may be relevant for improving efficiency or avoiding confusion or misunderstandings is provided in this form.

3.4 Generally Applicable Symbols

The following symbols and pictograms are also used in a broader context in this manual and on the product.

The presence of the "ESD" symbol is indicative of a risk of product damage caused by electrostatic discharge.

Direct current (DC) *(symbol definition IEC 60417-5031)*

Alternating current (AC) *(symbol definition IEC 60417-5032)*

Ground connection *(symbol definition IEC 60417-5017)*

Protective earth connection *(symbol definition IEC 60417-5019)*

4 Important Safety Information

The safety information provided in this chapter as well as specific safety warnings provided at relevant points in this manual must be observed during every installation, set-up, and operation procedure of the device, as well as its removal from service.

Any safety warnings affixed to the device itself must also be observed.

Any failure to observe this safety information, these safety warnings, and other safety-critical operating instructions in the product documentation, or any other improper usage of the device may result in unpredictable behavior from the product, and may result in injury or death.

Depending on your specific device configuration and installed options, some safety information may not be applicable to your device.

Meinberg accepts no responsibility for injury or death arising from a failure to observe the safety information, warnings, and safety-critical instructions provided in the product documentation.

It is the responsibility of the operator to ensure that the product is safely and properly used.

Should you require additional assistance or advice on safety-related matters for your product, Meinberg's Technical Support team will be happy to assist you at any time. Simply send a mail to **techsupport@meinberg.de**.

4.1 Appropriate Usage

The device must only be used appropriately in accordance with the specifications of the product documentation! Appropriate usage is defined exclusively by this manual as well as any other relevant documentation provided directly by Meinberg.

Appropriate usage includes in particular compliance with specified limits! The device's operating parameters must never exceed or fall below these limits!

4.2 Product Documentation

The information in this manual is intended for readers with an appropriate degree of safety awareness. The following are deemed to possess such an appropriate degree of safety awareness:

- skilled persons with a familiarity with relevant national safety standards and regulations,
- instructed persons having received suitable instruction from a skilled person on relevant national safety standards and regulations

If there is any safety information in the product documentation that you do not understand, **do not** continue with the set-up or operation of the device!

Read the product manual carefully and completely before you set the product up for use.

Safety standards and regulations change on a regular basis and Meinberg updates the corresponding safety information and warnings to reflect these changes. It is therefore recommended to visit the Meinberg website at **https://www.meinbergglobal.com** regularly to download up-to-date manuals.

Please keep all product documentation, including this manual, in a safe place in digital or printed format to ensure that it is always easily accessible.

Meinberg's Technical Support team is also always available at **techsupport@meinberg.de** if you require additional assistance or advice on safety aspects of your system.

4.3 Safety when Installing the Device

This rack-mounted device has been designed and tested in accordance with the requirements of the standard IEC 62368-1 (*Audio/Video, Information and Communication Technology Equipment—Part 1: Safety Requirements*). Where the rack-mounted device is to be installed in a larger unit (such as an electrical enclosure), additional requirements in the IEC 62368-1 standard may apply that must be observed and complied with. General requirements regarding the safety of electrical equipment (such as IEC, VDE, DIN, ANSI) and applicable national standards must be observed in particular.

The device has been developed for use in industrial or home environments and may only be used in such environments. In environments at risk of high environmental conductivity ("high pollution degree" according to IEC 60664-1), additional measures such as installation of the device in an air-conditioned electrical cabinet may be necessary.

If the unit has been brought into the usage area from a cold environment, condensation may develop; in this case, wait until the unit has adjusted to the temperature and is completely dry before setting it up.

When unpacking & setting up the equipment, and before operating it, be sure to read the information on installing the hardware and the specifications of the device. These include in particular dimensions, electrical characteristics, and necessary environmental conditions.

Fire safety standards must be upheld with the device in its installed state.

The device with the highest mass should be installed at the lowest position in the rack in order to position the center of gravity of the rack as a whole as low as possible and minimize the risk of the rack tipping over. Further devices should be installed from the bottom, working your way up.

The device must be protected against mechanical & physical stresses such as vibration or shock.

Never drill holes into the device to mount it! If you are experiencing difficulties with rack installation, contact Meinberg's Technical Support team for assistance!

Inspect the device housing before installation. The device housing must be free of any damage when it is installed.

4.4 Connection of Protective Earth Conductor/Grounding

In order to ensure that the device can be operated safely and to meet the requirements of IEC 62368-1, the device must be correctly connected to the protective earth conductor via the protective earth connection terminal.

If an external ground connection is provided on the housing, it must be connected to the grounding busbar (earthing busbar) for safety reasons before connecting the power supply. Like this, any possible leakage current on the housing is safely discharged to earth.

The screw, washer and toothed lock washer necessary for mounting the grounding cable are located at the grounding point of the housing. A grounding cable is not included in the contents of delivery.

Note: Please use a grounding cable with cross-section $\geq$ 1.5 mm^2, as well as a suitable grounding clamp/lug. Always ensure that the connection is properly crimped!

4.5 Electrical Safety

This Meinberg product is operated at a hazardous voltage.

This system may only be set up and connected by a skilled person, or by an instructed person who has received appropriate technical & safety training from a skilled person.

Custom cables may only be assembled by a qualified electrician.

Never work on cables carrying a live current!

Never use cables or connectors that are visibly damaged or known to be defective! Faulty, defective, or improperly connected shielding, connectors, or cables present a risk of injury or death due to electric shock and may also constitute a fire hazard!

Before operating the device, check that all cables are in good order. Ensure in particular that the cables are undamaged (for example, kinks), that they are not wound too tightly around corners, and that no objects are placed on the cables.

Cables must be laid in such a way that they do not present a tripping hazard.

The power supply should be connected using a short, low-inductance cable. Avoid the use of power strips or extension cables if possible. If the use of such a device is unavoidable, ensure that it is expressly rated for the rated currents of all connected devices.

Never connect or disconnect power, data, or signal cables during a thunderstorm! Doing so presents a risk of injury or death, as cables and connectors may conduct very high voltages in the event of a lightning strike!

The device cables must be connected or disconnected in the order specified in the user documentation for the device. Connect all cables only while the device is de-energized before you connect the power supply.

Always pull cable connectors out at both ends before performing work on connectors! Improperly connecting or disconnecting this Meinberg system may result in electric shock, possibly resulting in injury or death!

When pulling out a connector, **never** pull on the cable itself! Pulling on the cable may cause the plug to become detached from the connector or cause damage to the connector itself. This presents a risk of direct contact with live components.

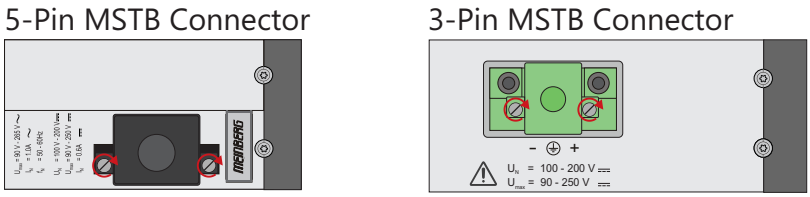


Fig.: Lock screws on an MSTB plug connector; in this case on a LANTIME M320

Ensure that all plug connections are secure. In particular, when using plug connectors with lock screws, ensure that the lock screws are securely tightened. This is especially important for power supply connectors where 3-pin or 5-pin MSTB connectors with lock screws are used (see illustration).

Before the device is connected to the power supply, the device housing must be grounded by connecting a grounding conductor to the grounding terminal of the device.

When installing the device in an electrical enclosure, it must be ensured that adequate clearance is provided, minimum creepage distances to adjacent conductors are maintained, and that there is no risk of short circuits.

Protect the device from the ingress of objects or liquids!

If the device malfunctions or requires servicing (for example, due to damage to the housing, power supply cable, or the ingress of liquids or objects), the power supply may be cut off. In this case, the device must be isolated immediately and physically from all power supplies! Electrical isolation must be performed and confirmed in accordance with the following procedure:

- Pull the power supply plug from the power supply.
- Loosen the locking screws of the MSTB power supply plug on the device and pull it out of the device.
- Contact the person responsible for your electrical infrastructure.
- If your device is connected to one or more uninterruptible power supplies (UPS), the direct power supply connection between the device and the UPS solution must be first be disconnected.

4.5.1 Special Information for Devices with AC Power Supply

This device is a Protection Class 1 device and may only be connected to a grounded outlet (TN system).

For safe operation, the installation must be protected by a fuse rated for currents not exceeding 16 A and equipped with a residual-current circuit breaker in accordance with applicable national standards.

The appliance must only ever be disconnected from the mains power supply via the mains socket and not from the appliance itself.

Make sure that the mains socket on the appliance or the mains socket of the house installation is readily accessible for the user so that the mains cable can be pulled out of the socket in an emergency.

Non-compliant cabling or improperly grounded sockets are an electrical hazard!

Only connect the appliance to a grounded shockproof socket using a safety-tested mains cable designed for use in the country of operation.

4.5.2 Special Information for Devices with DC Power Supply

In accordance with IEC 62368-1, it must be possible to disconnect the appliance from the supply voltage from a point other than the appliance itself (e.g., from the primary circuit breaker).

The power supply plug may only be fitted or dismantled while the appliance is isolated from the power supply (e.g., disconnected via the primary circuit breaker).

Power supply cables must have adequate fuse protection and have an adequate wire gauge size (1 mm^2 — 2.5 mm^2 / 17 AWG — 13 AWG)

The power supply of the device must have a suitable on-demand disconnection mechanism (i.e., a switch). This disconnection mechanism must be readily accessible in the vicinity of the appliance and marked accordingly as a cut-off mechanism for the appliance.

4.6 Safety when Handling SFP Modules

The SFP modules recommended by Meinberg are equipped with a Class 1 laser.

- Only use fiber optic SFP modules that are compliant with the definition of a Class 1 laser in accordance with IEC standard 60825-1. Fiber optic products that are not compliant with this standard may emit radiation capable of causing eye injuries.
- Never look into an unconnected connector of a fiber optic cable or an unconnected SFP port.
- Unused fiber optic connectors should always be fitted with a suitable protective cap.
- The safety information and manufacturer specifications relating to the SFP modules used must be heeded.
- The SFP module used must be capable of providing protection against voltage spikes in accordance with IEC 62368-1.
- The SFP module used must be tested and certified in accordance with applicable standards.

4.7 Safety when Maintaining and Cleaning the Device

Only use a soft, dry cloth to clean the device.

Never use liquids such as detergents or solvents to clean the device! The ingress of liquids into the device housing may cause short circuits in the electronic circuitry, which in turn can cause a fire or electric shock!

Neither the device nor its individual components may be opened. The device or its components may only be repaired by the manufacturer or by authorized personnel. Improperly performed repairs can put the user at significant risk!

In particular, **never** open a power supply unit or module, as hazardous voltages may be present within the power supply device even after it is isolated from the upstream voltage. If a power supply unit or module is no longer functional (for example due to a defect), it can be returned to Meinberg for repair.

Some components of the device may become very hot during operation. Do not touch these surfaces!

If maintenance work is to be performed on the device and the device housing is still hot, switch off the device beforehand and allow it to cool.

4.8 Battery Safety

The CR2032 lithium battery on the receiver module has a service life of at least 10 years.

Should it be necessary to replace the battery, please note the following:

- The battery may only be replaced by the same type or a comparable type recommended by the manufacturer.
- The battery may only be replaced by the manufacturer or authorized personnel.
- The battery must not be exposed to air pressure levels outside of the limits specified by the manufacturer.

Improper handling of the battery may result in the battery exploding or in leakages of flammable or corrosive liquids or gases.

- Never short-circuit the battery!
- Never attempt to recharge the battery!
- Never throw the battery in a fire or dispose of it in an oven!
- Never dispose of the battery in a mechanical shredder!

5 Important Product Information

5.1 CE Marking

This product bears the CE mark as is required to introduce the product into the EU Single Market.

The use of this mark is a declaration that the product is compliant with all requirements of the EU directives effective and applicable as at the time of manufacture of the product. These directives are listed in the EU Declaration of Conformity, appended to this manual as Chapter 14.

5.2 UKCA Marking

This product bears the British UKCA mark as is required to introduce the product into the United Kingdom (excluding Northern Ireland, where the CE marking remains valid).

The use of this mark is a declaration that the product is in conformity with all requirements of the UK statutory instruments applicable and effect as at the time of manufacture of the product. These statutory instruments are listed in the UK Declaration of Conformity, appended to this manual as Chapter 15.

5.3 Ensuring the Optimum Operation of Your Device

- Ensure that ventilation slots are not obscured or blocked by dust, otherwise heat may build up inside the device. While the system is designed to shut down automatically in the event of temperature limits being exceeded, the risk of malfunctions and product damage following overheating cannot be entirely eliminated.
- The device is only deemed to be appropriately used and EMC limits (electromagnetic compatibility) are only deemed to be complied with while the device housing is fully assembled in order to ensure that requirements pertaining to cooling, fire safety, electrical shielding and (electro)magnetic shielding are upheld.

5.4 Maintenance and Modifications

Important!

Before performing any maintenance work on or authorized modification to your Meinberg system, we recommend making a backup of any stored configuration data (e.g., to a USB flash drive from the Web Interface).

5.4.1 Replacing the Battery

Your device's receiver module is fitted with a lithium battery (type CR2032).

This battery has a life of at least ten years. However, if the device develops the following unexpected behaviors, the voltage of the battery may have dropped below 3 V, and the battery needs to be replaced as a result:

- The reference clock has the wrong date or wrong date when the system is started.
- The reference clock repeatedly starts in Cold Boot mode (i.e., upon starting, the system has no ephemeris data saved whatsoever, resulting in the synchronization process taking a very long time due to the need to rediscover all of the visible satellites).
- Some configuration options relating to the reference clock are lost every time the system is restarted.

In this case you should not replace the battery on your own. Please contact the Meinberg Technical Support team, you will provide you with precise guidance on how to perform the replacement.

5.5 Prevention of ESD Damage

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

Precautionary measures should be taken to protect ESDS components from damage and malfunction.

- Before removing or installing ESDS components, ground your body first (for example, by touching a grounded object) before touching ESDS modules.
- Ensure that you wear a grounding strap on your wrist when handling such ESDS components. These straps must in turn be attached to an uncoated, non-conductive metal part of the system.
- Use only tools and equipment that are free of static electricity.
- Only touch or hold ESDS components by the edges. Never touch any pins or conductors on the ESDS components.
- When removing or installing ESDS components, avoid coming into contact with persons who are not grounded. Such contact may compromise your connection with the grounding conductor and thus also compromise the ESDS component's protection from any static charges you may be carrying.
- Always store ESDS components 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 ESDS components has a lithium battery fitted on it.

5.6 Disposal

Disposal of Packaging Materials

The packaging materials that we use are fully recyclable:

Material	Use for	Disposal
Polystyrene	Packaging frame/filling material (e.g., polystyrene peanuts)	Recycling Depot
PE-LD (Low-density polyethylene)	Accessories packaging, bubble wrap	Recycling Depot
Cardboard	Shipping packaging, accessories packaging	Paper Recycling

For information on the proper disposal of packaging materials in your specific country, please inquire with your local waste disposal company or authority.

Disposal of the Device

This product falls under the labeling obligations of the Waste Electrical and Electronic Equipment Directive 2012/19/EU ("*WEEE Directive*") and thus bears this WEEE symbol. The presence of this symbol indicates that this electronic product may only be disposed of in accordance with the following provisions.

Important!

Do not dispose of the product or batteries via the household waste. Inquire with your local waste disposal company or authority on how to best dispose of the product or battery if necessary.

This product is considered to be a "**B2B**" product for the purposes of the WEEE Directive and is also classified as "**IT and Telecommunications Equipment**" in accordance with Annex I of the Directive.

It can be returned to Meinberg for disposal. In this case, the shipping costs are to be borne by the customer, while Meinberg will cover the costs for disposal. If you wish for Meinberg to handle disposal for you, please get in touch with us. Otherwise, please use the return and collection systems provided within your country to ensure that your device is disposed of in a compliant fashion to protect the environment and conserve valuable resources.

Disposal of Batteries

Please consult your local waste disposal regulations for information on the correct disposal of batteries as hazardous waste.

6 microSync Introduction

microSync is a multipurpose synchronization solution with compact design and high performance. The microSync system provides multiple output signals and allows synchronization of both NTP clients and PTP slaves.

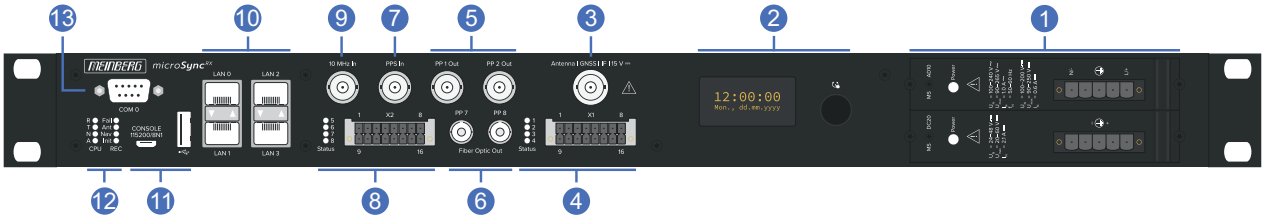
The device has four 100/1000 MBit network interfaces and can provide both, optical and electrical network connections by using SFP modules. It is possible to use different receiver variants, e.g. the 72-channel GNSS receiver for GPS, Galileo, GLONASS and BeiDou.

The sync optimized operating system supports NTP, PTP IEEE 1588 and a variety of protocols for management tasks.

Product Highlights

- Powerful IEEE 1588 PTP Time Server incl. IEC/IEEE 61850-9-3 & IEEE C.37.238
- High performance (S)NTP server
- Redundant power supply
- Different Oscillator options for advanced holdover performance
- Comprehensive Web UI and Meinberg Device Manager software for configuration and status monitoring (see chapter Starting of Operation)
- Three-year manufacturer's warranty
- Unlimited technical support including firmware updates

7 microSync RX412/AD10DC20 Connectors



7.1 AC/DC Power Supply

Important!

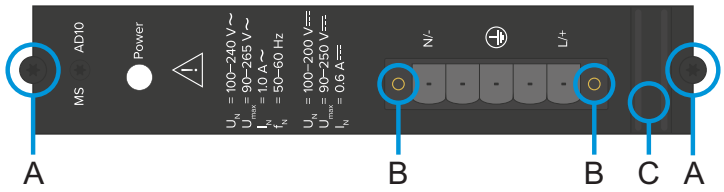
Hotplug

It is possible to remove or install power supplies from the system housing during operation.

Required Tools

- Slot screwdriver 0.4 mm thick, 2,5 mm wide
- Screwdriver Torx TR8x60

Hints for Hot-Plug compatible Power Supplies
Replacing the power supply unit

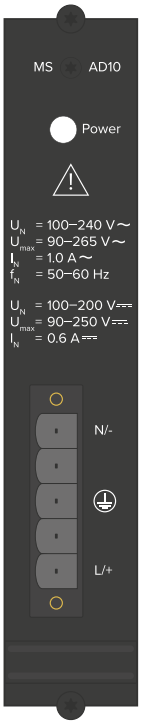


1. Interrupt the power supply of the power supply unit by pulling off the protective plug of the power cable.
2. Remove the 5-pin DFK-jack from the power supply after dissolving the two clamping screws (B) with the slot screwdriver.
3. Then loosen the two Torx screws (A) of the power supply that needs to be replaced with the Torx screwdriver (TR8).
4. The dissolved power supply can be removed with the handle (C) now.
5. Put the new power supply in the free slot and secure it with the two previously dissolved Torx fastening screws (A).
6. Connect the 5-pin DFK jack of the power cable to the power supply and put the two slit screws (B) back on.
7. The protective contact plug of the power cable can be reconnected to the power supply.
8. The LED of the new power supply should now light up. Furthermore, the status **Power Supply** "green" should be displayed in the Status System menu of the Meinberg Device Manager.

The status LED of the new power supply should now light up. The "OK" status must be displayed in the system's web interface.

Checking Power Status
The status of the power supplies can be observed in the program ***Meinberg Device Manager*** under "Status → System Status".

AD10 - AC/DC Power Supply



Connector Type: 5-pol. DFK

Pin Assignment:
1: N/-
2: not connected
3: PE (Protective Earth)
4: not connected
5: L/+

Input Parameter

Nominal Voltage Range:	U_N	=	100-240 V ~ 100-200 V ⎓
Maximum Voltage Range:	U_{max}	=	90-265 V ~ 90-250 V ⎓
Nominal Current:	I_N	=	1.0 A ~ 0.6 A ⎓
Nominal Frequency Range:	f_N	=	50-60Hz
Maximum Frequency Range:	f_{max}	=	47-63Hz

Output Parameter

Maximum Power:	P_{max}	=	50 W
Max. Heat Emisson:	E_{therm}	=	180.00 kJ/h (170.61 BTU/h)

Danger!

This equipment is operated at a hazardous voltage.

Danger of death from electric shock!

- This device must be connected by qualified personnel (electricians) only.
- Never handle exposed terminals or plugs while the power is on.
- All connectors must provide protection against contact with live parts in the form of a suitable plug body!

- Note: Always ensure that wiring is safe!

- Important: The device must be grounded by means of a connection with a correctly installed protective earth conductor (PE).

DC20 - DC Power Supply

Connector Type: 5pin DFK

Pin Assignment:
1: not connected
2: V_{IN} -
3: PE (Protective Earth)
4: V_{IN} +
5: not connected

Input Parameter

Nominal Voltage Range:	U_N	=	24-48 V ⎓
Maximum Voltage Range:	U_{max}	=	20-60 V ⎓
Nominal Current:	I_N	=	2.10 A ⎓

Output Parameter

Maximum Power:	P_{max}	=	50 W
Max. Heat Emission:	E_{therm}	=	180.00 kJ/h (170.61 BTU/h)

7.2 microSync OLED Display

For the microSync^{RX} models an OLED display is optionally available. With this display the network management port LAN 0 can be configured for initial start of operation.

The configuration is limited to the setting of the IP address, the netmask, the gateway and the activation/deactivation of the DHCP service. In addition, the status of the receiver can be queried via the display:

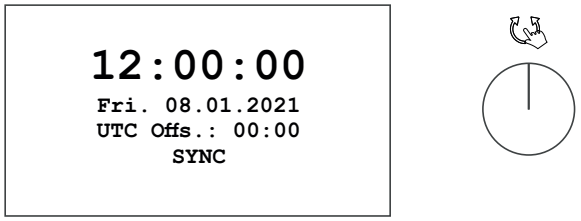
- Time (time / date / offset)
- Status [sync, not sync or holdover].
- Technical data of the receiver
- Network configuration

In idle state, the display shows the time, date and sync status of the system.

You can navigate through the menu with the rotary knob, pressing the knob confirms your entry. In this way, submenus can be called up by pressing the knob or parameters can be reset. When a parameter change has been made, press and hold the rotary knob for a few seconds - "**Save**" will then appear. Use the rotary knob to select either "**Yes**" to save the configuration or "**No**" to exit the menu without saving the changes.

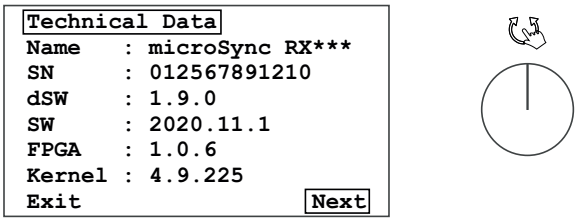
Menu Navigation

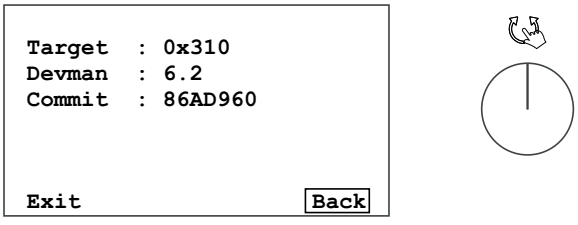
1. Start Display
Display of time / date / UTC offset
and sync status



2. Technical Data
The technical data provides the most important information about the connected system (i.e. the microSync) that is relevant for technical support or sales. In addition to the usual information, such as name and software version (SW → Software Version of the connected system), additional hardware-specific data, such as the FPGA, kernel or target version, are also shown in the display.

For optimum technical support, the Device Manager version (Devman), which should support all current functions, and the commit value, which is an internal identification for the software, are displayed.



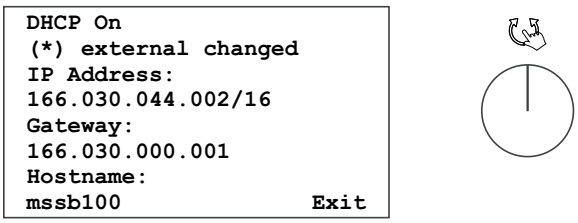


- System type - e.g.: microSync RX412/AD10DC20
- SN - serial number
- dSW - display software version
- SW - firmware version
- FPGA - version
- Kernel - version

3. System Status Info

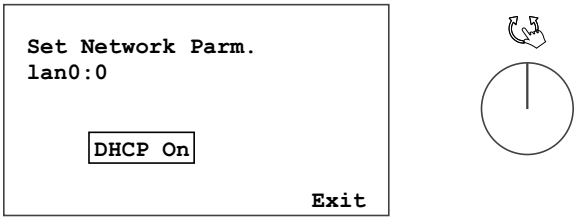
The hint "**external changed**" indicates that the configuration made via the display has been changed externally. This case occurs if e.g. the IP address, which was configured via the display, is changed by using the Meinberg Device Manager later.

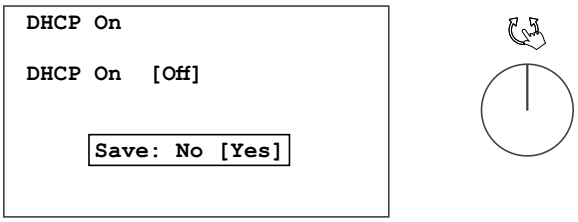
- DHCP - On / Off
- IP address / Subnet mask
- Gateway
- Hostname



4. Network Parameters (DHCP On)

In this menu item only the DHCP service can be deactivated, all other parameters are set by the DHCP service.

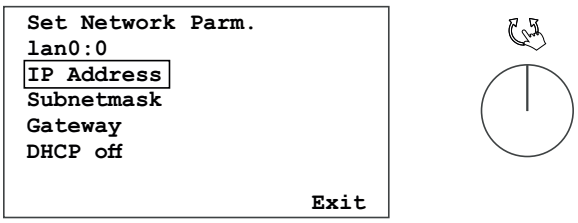


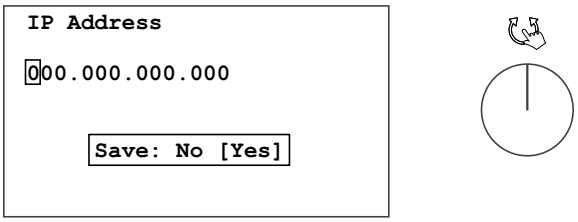


5. Network Parameter (DHCP Off)

After selection, the IP address can be entered by turning and pressing the rotary knob. The subnet mask and gateway can also be configured in the same way.

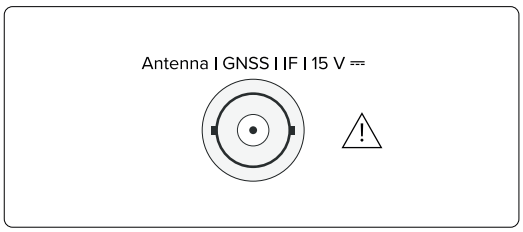
These settings are only possible if the DHCP service has been disabled before.





7.3 GPS Antenna

Antenna input
GNS181-UC: Antenna circuit electrically isolated



Dielectric strength: 1000 V

Mixed frequency
Reference clock to antenna
(GPS-converter): 10 MHz [1]

IF frequency
Antenna (GPS-converter)
to reference clock: 35.4 MHz [1]

1) these frequencies are transfered via the antenna cable

Output voltage: 15 V, 100 mA (via antenna cable)

Connection type: BNC-female/N-standard female

Cable type: Coaxial cable, shielded, max. 300 m to RG58 / max. 700 m to RG213

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.

7.4 Programmable pulse output

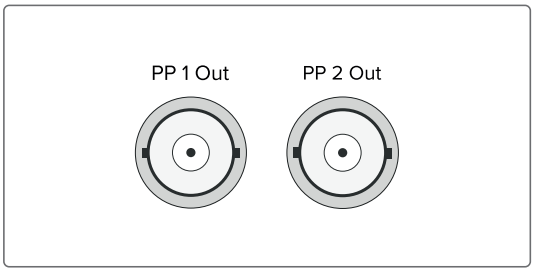
Signal output Programmable pulses

Signal level: TTL; 2.5 V into 50 Ohm

Connector: BNC, female

Cable: Coaxial cable, shielded

Pulse outputs:
Pulse Per Second
Cyclic Pulse
Single Shot
Timer
Idle
All Sync
Time Sync
Position OK
DCF77 Marks
Pulse Per Hour
Pulse Per Min
DCLS Time Code
Serial Time String
10 MHz Frequency
Synthesizer Frequency
PTTI 1PPS



7.5 Pulse Per Second Input

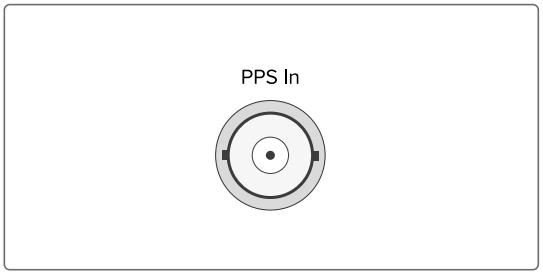
Input signal PPS (pulse per second)

Signal level: TTL

Pulse lenght: $\geq 5\ \mu$s, active high

Connection type: BNC, female

Cable: Coaxial cable, shielded



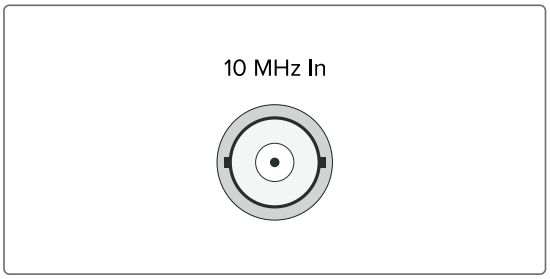
7.6 10 MHz Input

Input Signal: 10 MHz Sine Wave Signal or TTL

Signal Level: 1.5 V_{pp} - 5 V_{pp}

Connector Type: BNC Connector, Female

Cable: Coaxial Cable, Shielded



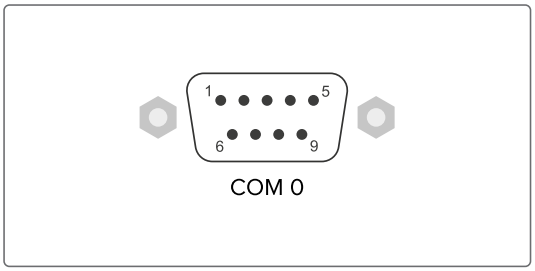
7.7 RS-232 COMx Timestring

Data transfer: serial

Baudrate/framing: 19200 / 8N1 (default)

Time-string: Meinberg Standard (default)

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



Connector: 9pin D-SUB male

Cable: data cable (shielded)
PC connector 1:1

Synchronization with PPS + String:
Pin 1 - PPS In

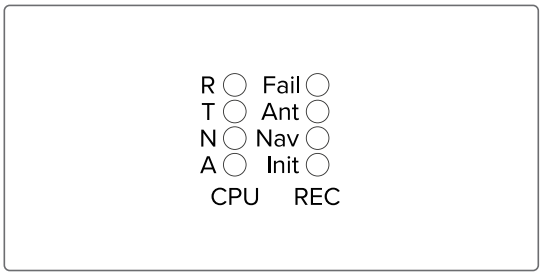
Signal level: TTL

Pulse length: $\geq$5 μs (active high)

Pin 2 - String* In (RxD)

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

7.8 Status Indicators - CPU and Receiver



CPU:

R (Receiver)

green:	The reference clock (e.g. build-in GNS181-UC) provides a valid time
red:	the reference clock does not provide a valid time

T (Time Service)

green:	NTP is synchronized to the reference clock, e.g. GNS181-UC
red:	NTP is not synchronized or switched to the "local clock"

N (Network)

green:	All monitored network interfaces are connected ("Link up")
red:	At least one of the monitored network interfaces is faulty

A (Alarm)

off:	No error
red:	General error

REC:

Fail

red:	No synchronization

Ant

red:	No synchronization resp. no antenna connected or short circuit on the antenna line
green:	Antenna connected and clock is synchronized

Nav

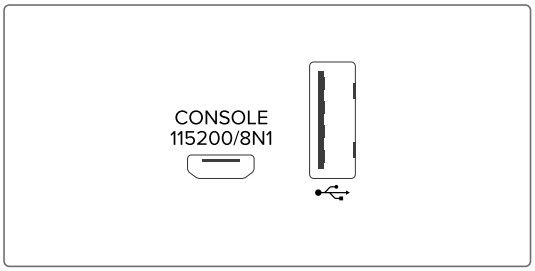
green:	Positioning complete

Init

blue:	Initialisation phase
green:	"warmed up" - oscillator is adjusted

7.9 USB Interface

Signal	Signal Type	Connector
USB Terminal	USB-to-serial console	Micro-USB Type B
USB Host	USB connector management CPU	USB Type A



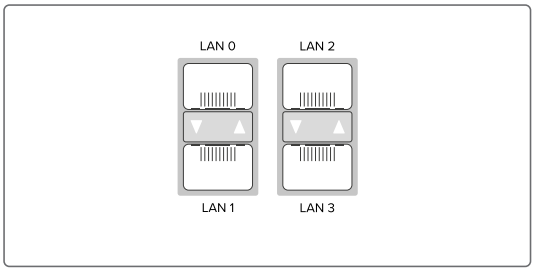
7.10 LAN Network Interfaces

Gigabit Ethernet (GbE), 100/1000 MBit - SFP

LAN 0, 1: Management / NTP
10/100/1000Mbit RJ45 or 1000FX

LAN 2, 3: Management
10/100/1000Mbit RJ45 or 1000FX
NTP / PTP

Synchronous Ethernet:
Master and Slave Capability
Compliant to ITU-T G.8261, G.8262 and G.8264
Ethernet Synchronization Messaging Channel (ESMC)



Available SFP Modules

SFP Tranceivers Recommended and Tested by Meinberg

Output Type	Manufacturer Designation
Multi Mode:	Avago AFBR-5710PZ Finisar FTLF8524P3BNL Cisco GLC-SX-MMD
Single Mode:	Avago AFCT-5710PZ Finisar FTLF1318P3BTL
RJ-45:	Avago ABCU-5740RZ Finisar FCLF8521P2BTL

Warning!

Prevention of Eye Injuries

- Fiber optic SFP modules that are not compliant with the definition of a Class 1 laser in accordance with IEC standard 60825-1 may emit radiation capable of causing eye injuries.
- Never look into an unconnected connector of a fiber optic cable or an unconnected SFP port, and ensure that unused fiber optic connectors are always fitted with a suitable protective cap.

7.11 DMC X2 Terminal Connector

Note: The connector on the device side and the connection socket of the X2 terminal are provided with coding pins to avoid confusion with the X1 connection terminal.

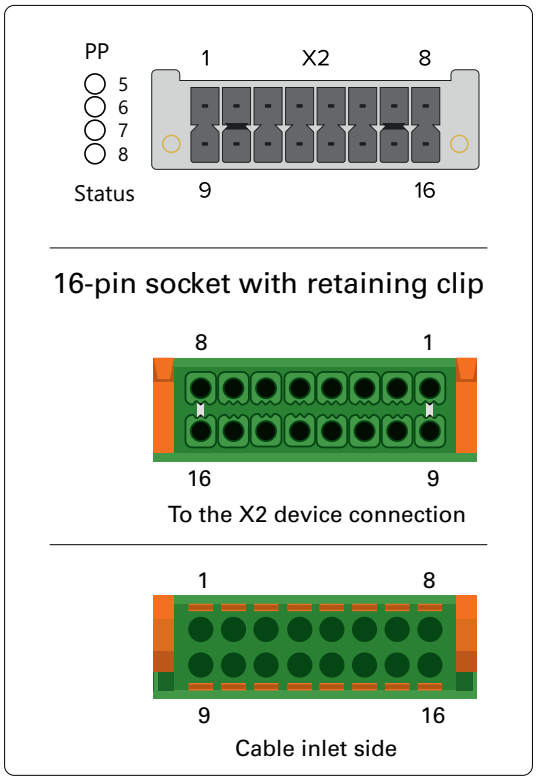
Pin 1	PP 5+	programmable pulse (optocoupler)
Pin 2	PP 5	programmable pulse (RS-422A)
Pin 3	PP 5	programmable pulse (RS-422B)
Pin 4	PP 6	programmable pulse (RS-422A)
Pin 5	PP 6	programmable pulse (RS-422B)
Pin 6	+ TC In	Time Code DCLS (TTL, isolated)
Pin 7	+ TCA* Out	Time Code DCLS (TTL, isolated)
Pin 8	- TCA Out	Time Code DCLS (TTL, isolated) *TTL active high 250mA, short circuit proof*

* **TCA** = Time Code Amplified, DCLS output with large output current.

Pin 9	PP 5-	program. pulse (optocoupler)
Pin 10	GND	ground
Pin 11	GND	ground
Pin 12	GND	ground
Pin 13	GND	ground
Pin 14	- TC In	Time Code DCLS (TTL, isolated)
Pin 15		not used
Pin 16		not used

Status-LEDs:

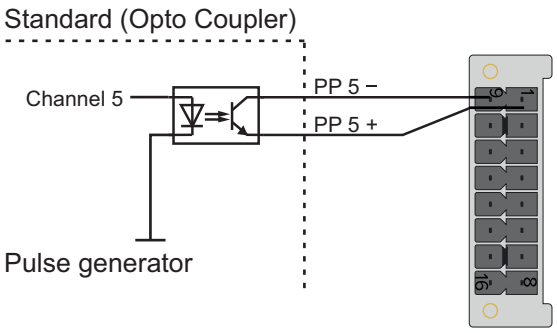
PP 5 ... PP 8	Status of Pulses Out



Scheme Terminal assignment
Programmable output PP 5
DC-insulated by optocouplers

U_{CEmax}	= 55 V
I_{Cmax}	= 50 mA
P_{tot}	= 150 mW

Response time
Turn on Time: typ. 5μs, max. 9μs
Turn off Time: typ. 10μs, max. 70μs



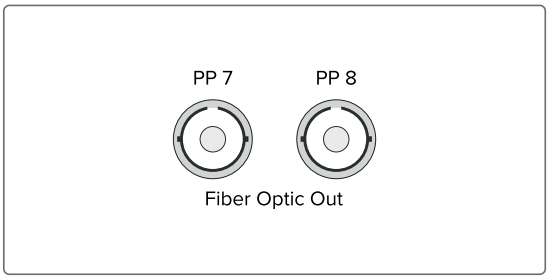
7.12 Fiber Optic - Programmable pulse Output

Output signal: Programmable pulses, fiber optic

Wave lenght: 850 nm (multi mode)

Connection type: ST-connector

GI 50/125 μm or
62.5/125 μm gradient fibre



Pulse outputs:
Pulse Per Second
Cyclic Pulse
Single Shot
Timer
Idle
All Sync
Time Sync
Position OK
DCF77 Marks
Pulse Per Hour
Pulse Per Min
DCLS Time Code
Serial Time String
10 MHz Frequency
Synthesizer Frequency
PTTI 1PPS

Caution!

The optical interface contains a light-emitting diode (LED).

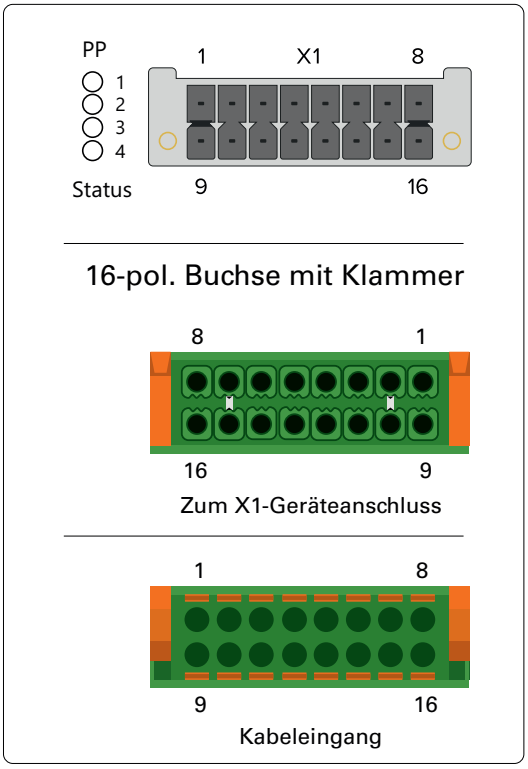
Unused optical interfaces should always have a protective cap placed on them when not in use.

7.13 DMC X1 Terminal Connector

Pin 1		not used
Pin 2		not used
Pin 3	PP 1-	programmable pulse
Pin 4	PP 2-	programmable pulse
Pin 5	PP 3-	programmable pulse
Pin 6	PP 4-	programmable pulse
Pin 7	REL-NO	Error/Relay (normally open)
Pin 8	REL-CO	Error/Relay (common)
Pin 9	not used	
Pin 10		not used
Pin 11	PP 1+	programmable pulse
Pin 12	PP 2+	programmable pulse
Pin 13	PP 3+	programmable pulse
Pin 14	PP 4+	programmable pulse
Pin 15	not used	
Pin 16	REL-NC	Error-Relay (normally closed)

Status-LEDs:

PP 1 ... PP 4	Status of the programmable Pulses Out

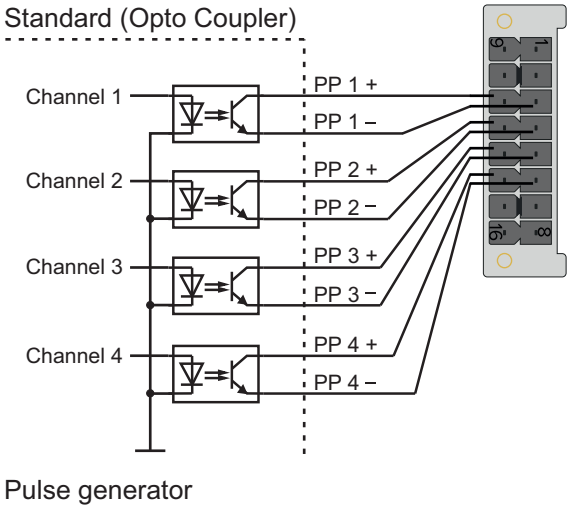


Scheme Terminal assignment
Programmable Pulses

Four programmable outputs (PP 1 - PP 4)
DC-insulated by optocouplers

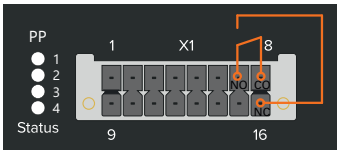
U_{CEmax} = 55 V
I_{Cmax} = 50 mA
P_{tot} = 150 mW

Response time
Turn on Time: typ. 5μs, max. 9μs
Turn off Time: typ. 10μs, max. 70μs

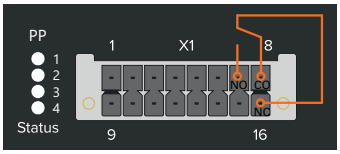


Error Relay
The X1 connector has a potential-free contact which is controlled directly by the used reference clock (GPS, GNS, GNS-UC). Normally, when the reference clock has synchronized, the the relay contact "NO" switch to active. If the reception is disturbed or the device is switched off, the relay contact "NC" is active.

Normal Operation Mode:
CO - NO connected
(normally open)



Error Mode:
CO - NC connected
(normally closed)



Technical Specification

Switching Voltage max:	60 V DC
Switching Current max:	I_{max}: 400 mA
Switching Load max:	24 W
Response Time:	ca.2 ms

8 Information on Satellite Reception

8.1 GNS-UC Satellite Receiver

Your system is fitted with the GNS181-UC, a 72-channel satellite receiver clock that serves as a high-accuracy time and frequency reference for your Meinberg system and is designed to receive signals from the United States GPS (Global Positioning System) and European Galileo system using a Meinberg antenna/converter unit, enabling a choice of time references from the combined GPS and Galileo systems.

The GNS-UC reference clock allows for simultaneous reception of signals from both of these systems, and the system can be configured to allow only signals from a selected satellite system. It is possible, for example, to exclude a certain system as needed, restricting reception to a single satellite system.

The receiver is capable of operating while moving at high speeds, providing dependable, high-accuracy synchronization signals whether in a fixed location or in motion on high-speed vehicles such as aircraft, ships, or trucks.

8.2 How Satellite Navigation Works

The use of a receiver for location tracking and time synchronization relies on the ability to measure the satellite-to-receiver propagation delay as precisely as possible. It is necessary to have simultaneous reception from four satellites so that the receiver can determine its relative spatial position in three dimensions (x, y, z) and measure the deviation of its clock against the system clock. Monitoring stations around the planet track the orbital trajectory of the satellites and detect deviations between the local atomic clocks and the system time. The collected data is transmitted up to the satellites, which then send navigation data back to Earth.

The high-precision trajectory data of each satellite, known as the satellite's ephemeris, is needed by the receiver to continuously calculate the precise location of the satellites in space. A roughly defined ephemeridal schedule based on empirical data, referred to as an almanac, is used by a receiver to identify which satellites are visible above the horizon given a specific location and time. Each satellite transmits its own ephemeridal schedule as well as the almanacs of all existing satellites.

Satellite Systems

GPS was installed by the United States Department of Defense (US DoD) and operates at two performance levels: the Standard Positioning Service, or SPS, and the Precise Positioning Service, or PPS. The structure of the messages transmitted by the SPS has been openly published and reception is provided for public use. The timing and navigation data of the more precise PPS is encrypted and is thus only accessible to certain (usually military) users.

GLONASS was originally developed by the Russian military for real-time navigation and ballistic missile guidance systems. GLONASS satellites also send two types of signal: a Standard Precision Signal (SP) and an encrypted High Precision Signal (HP).

BeiDou is a Chinese satellite navigation system. The second-generation system, officially referred to as the BeiDou Navigation Satellite System (BDS) and also known as "COMPASS", consists of 35 satellites. BeiDou entered service in December 2011 with ten satellites and was made available to users in the Asia-Pacific region. The system was completed in June 2020 with the launch of the final satellite.

Galileo is an in-development global European satellite navigation and time reference system controlled by a civilian authority (European Union Agency for the Space Programme, EUSPA). Its purpose is the worldwide delivery of high-precision navigation data and is similarly structured to the American GPS, Russian GLONASS and Chinese BeiDou systems. The main differences in the systems lie in their approaches to frequency usage & modulation and the satellite constellation.

8.2.1 Time Zones and Daylight Saving Time

GPS System Time is a linear timescale that was synchronized with the international UTC timescale (Coordinated Universal Time) when the satellite system became operational in 1980. Since it has entered service, however, several leap seconds have been introduced to the UTC timescale to adjust UTC time to irregularities in the Earth's rotation. While GPS System Time deviates from UTC time by several seconds for this very reason, satellite messages do incorporate the number of seconds by which these timescales deviate from one another, allowing GPS receivers to be synchronized internally with the international UTC timescale.

The receiver's microprocessor can identify any time zone based on UTC time and automatically apply Daylight Saving Time adjustments over several years if so configured by the user.

9 Installation of a GPS Antenna

Danger!

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!

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.

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:

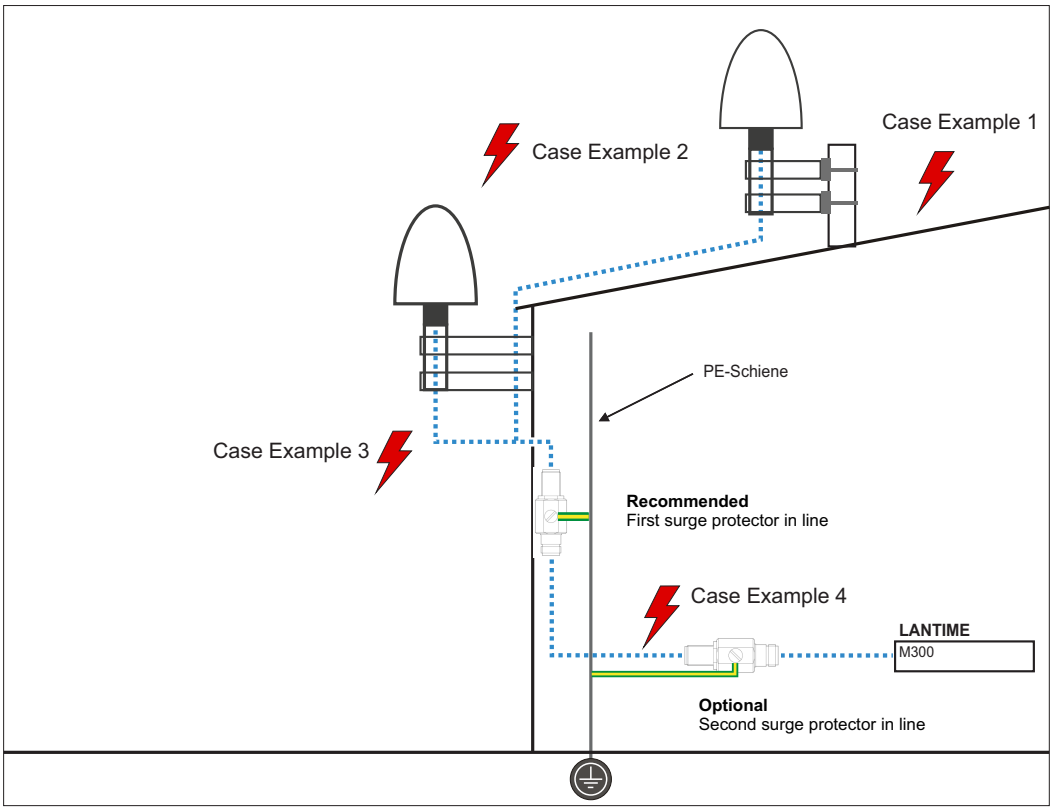
- clear view of 8° above the horizon or
- clear view towards equator (if clear view of 8° not possible) or
- clear view between 55th north and 55th south parallels (satellite orbits).

Information:

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 (GNS 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.

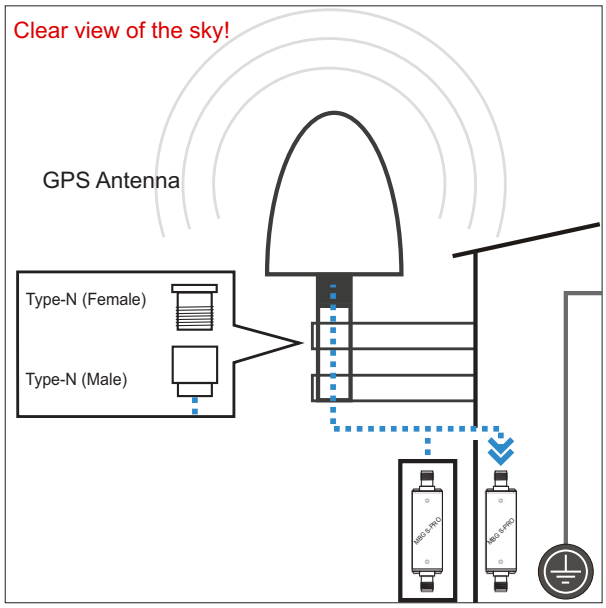
Case Example 4:
If the cable leading from the point of entry into the building to the Meinberg system is laid together with other cables (for example in a cable duct alongside high-voltage cables), transient voltages may "leak" into the antenna cable, causing damage to your system. To prevent this, a 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 min. 50 cm (20 in) 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.



Information:

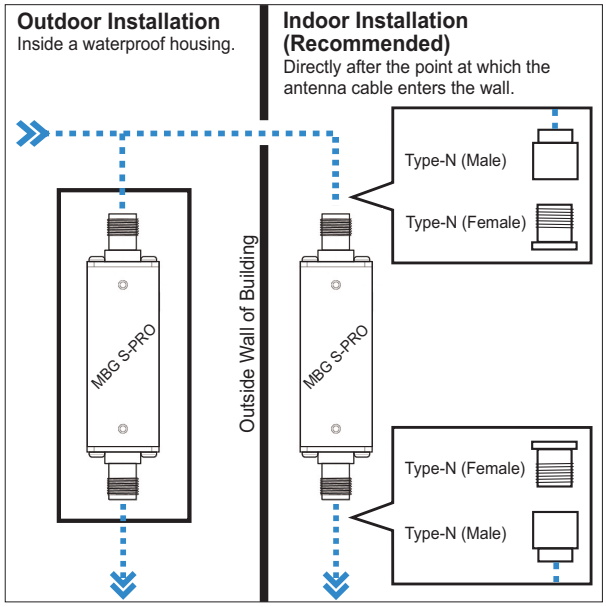
Make sure that the maximum cable length is not exceeded when installing the antenna cable between the antenna and receiver. The maximum length will depend on the type of cable used (RG213, RG58) and its attenuation factor.

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).

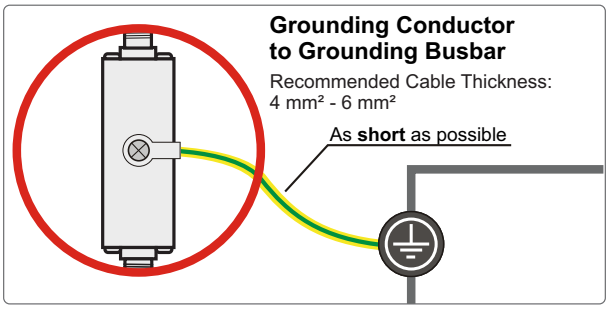
Connect the other end of the antenna cable to the female connector of the surge protector.



3.

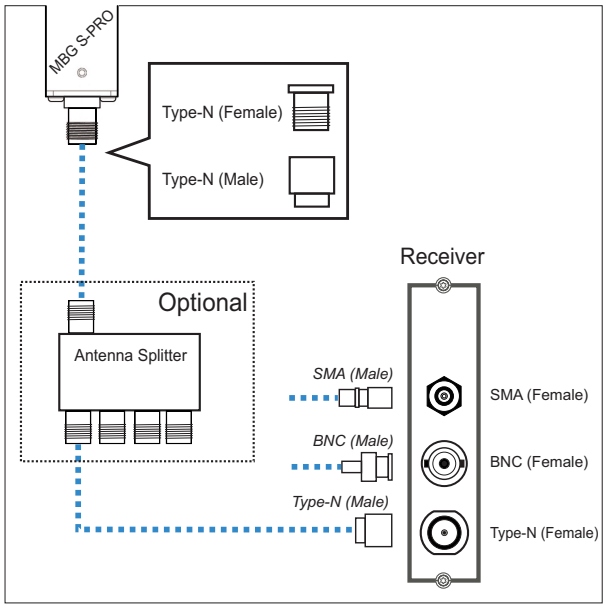
To ground the antenna cable, connect the surge protector to a grounding busbar using a grounding conductor (see illustration).

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.

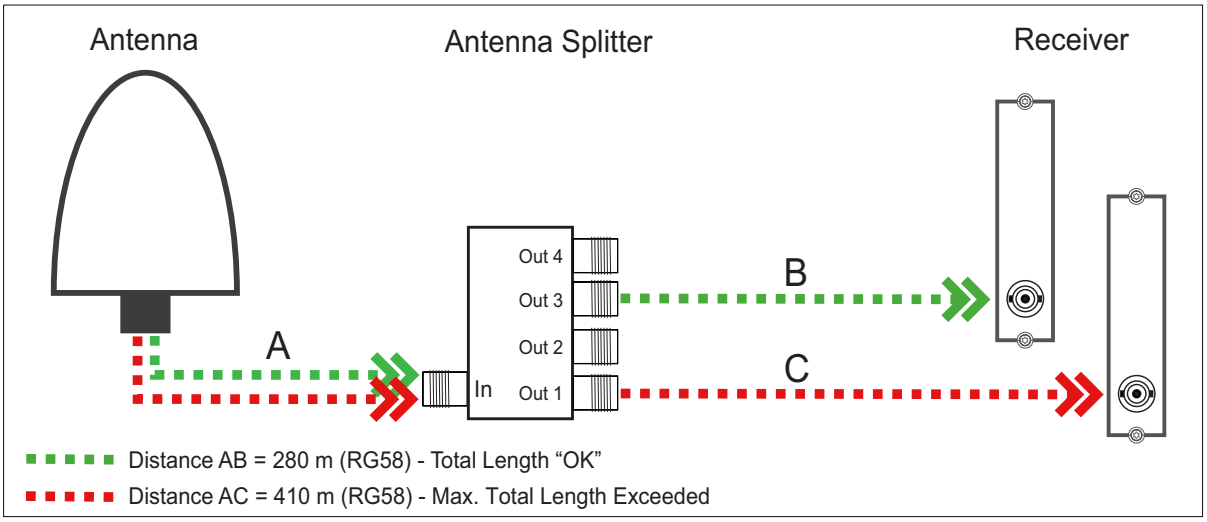


Optional Antenna Splitter

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.

Information:

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

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.

10 Starting of Operation

10.1 Initial Network Configuration

Once the microSync has been successfully started, the initial setup process can be performed.

The microSync is shipped with DHCP disabled and a statically configured IP address. This means that a network connection must be manually established to be able to setup the device fully.

There are three ways to perform the basic network configuration of your microSync:

- Configuration via a serial connection, see Chapter **10.1.1**.
- Configuration via the Web Interface, see Chapter **10.1.2**.
- Configuration via Meinberg Device Manager, see Chapter **10.1.3**.

10.1.1 Network Configuration via Serial Connection

The initial network configuration of the microSync can also be performed via a serial USB connection. You can connect the USB port on the PC with the micro-USB port of the microSync using a standard USB cable (Micro-USB Type B to USB-A). Your PC will recognize this connection as a serial connection.

Under Windows, you can identify which COM interface is used to communicate by opening the Device Manager. The information is usually provided under the group "*Ports (COM & LPT)*".

In many commonly used Linux distributions, the output of the terminal command *dmesg* can be used to identify which serial interface is to be used to communicate with the microSync. The relevant entry would look something like this:

```
[77833.359948] usb 1-1.2.1.6.3:  FTDI USB Serial Device converter now
attached to ttyUSB0
```

This reveals, for example, that you should establish a connection via /dev/ttyUSB0.

You can now use a terminal client such as PuTTY to establish a serial connection with the system.

Use the following connection parameters:

Conn. Type: Serial

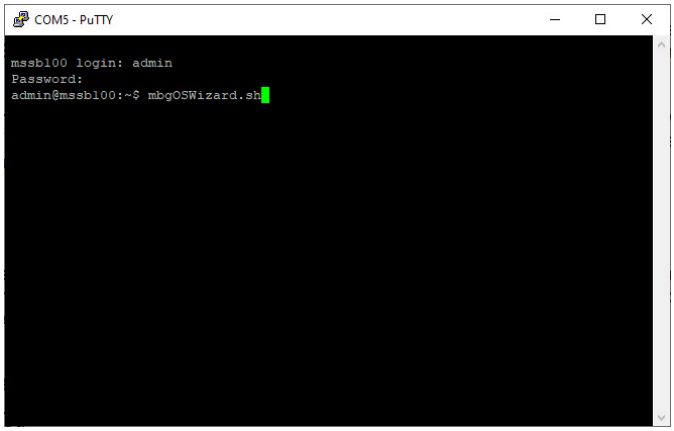
Serial Line: The serial interface identified as above (e.g., *COM13* or */dev/ttyUSB0*)

Speed: 115200

Framing: 8N1

Once the connection has been detected, you will be prompted to enter a username and password. User: *admin* / Password: *timeserver*. Press the Enter key after each entry.

Once a connection has been successfully established, you can use the meinbergOS Wizard to perform the initial network configuration.



First, launch the wizard by entering *mbgOSWizard.sh*; this will prompt you to enter the password (Default: *timeserver*).

You can now select the physical network interface that you wish to use for management purposes. The next step is to enter the IPv4 address that you wish to assign to the selected port. The final step is to enter the subnet mask (e.g., 255.255.255.0). You can then confirm your entries with '*y*'.

The initial network configuration process is now complete and you can close the setup wizard. All further configuration can be performed using the Web Interface or Meinberg Device Manager.

Information:

If the microSync's network configuration has already been previously performed using the Web Interface or Meinberg Device Manager, you will not be able to do this using *mbgOSWizard.sh*.

10.1.2 Network Configuration via Web Interface

The network configuration for the microSync can be performed via the Web Interface. In its factory-shipped state, the microSync has the following network configuration:

Network Port LAN 0

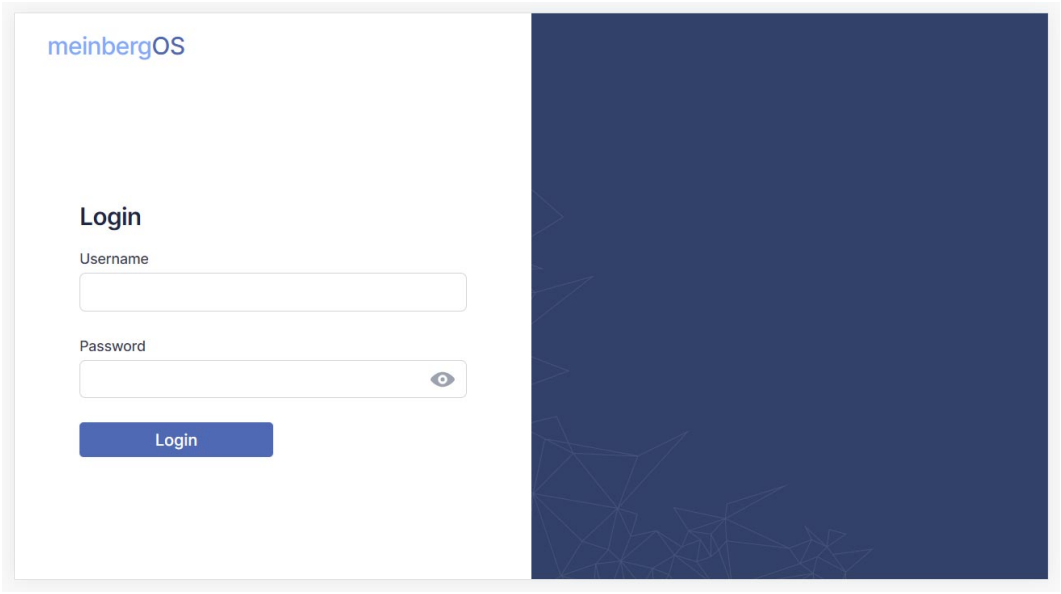
IPv4 Address: *192.168.19.79*

Subnet Mask: *255.255.255.0*

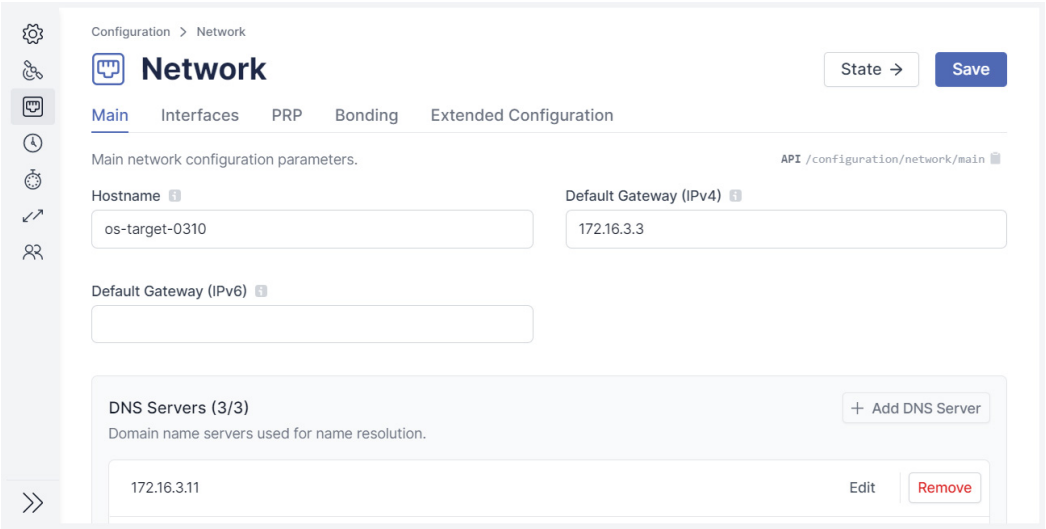
Gateway: Not defined

DHCP: Disabled

The PC from which the Web Interface will be accessed via a browser must be able to establish a network connection with the above address in the appropriate subnet. If the PC's network configuration or the network's topology or addressing prevent a connection from being established with the microSync, the network configuration of the PC will need to be (temporarily) changed and a different physical connection may need to be established (e.g. a direct network connection).



Open a web browser of your choice and open the address *https://192.168.19.79*. This should bring up the login page. Enter "*admin*" as the username and "*timeserver*" as the password.



As soon as the Dashboard appears, click on the "**Configuration**" section in the Header Bar, then select the "**Network**" tile. Be sure in particular to correctly configure the network settings for the intended management interface ("**Interfaces**" tab) to ensure that it is accessible within the subnet.

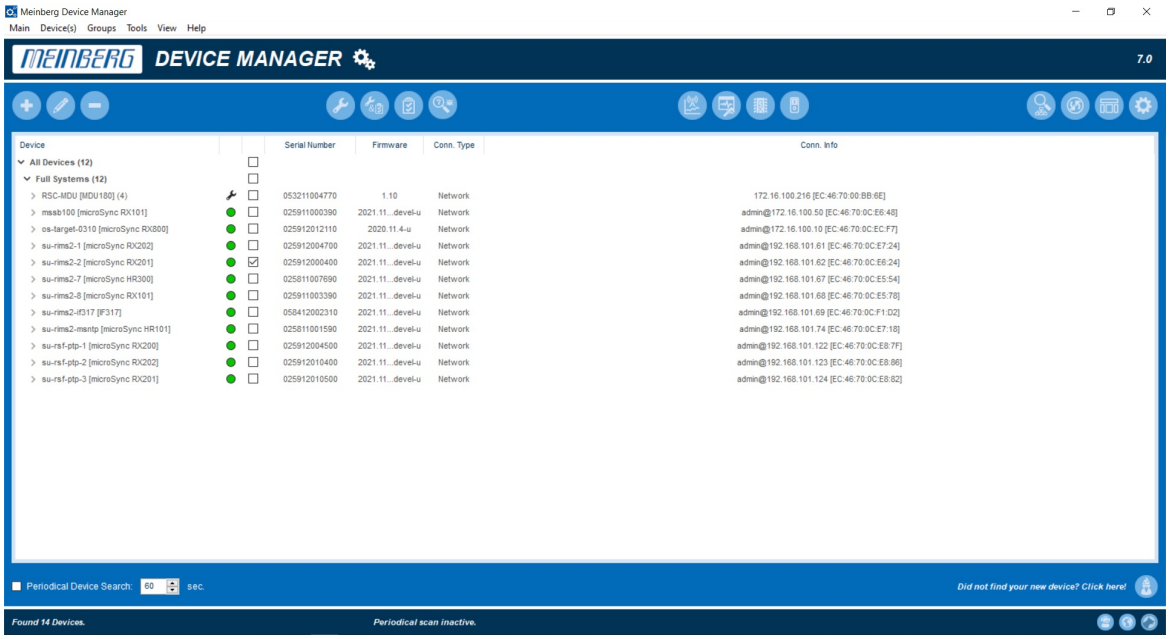
Once you have performed the configuration, click on "**Save**" to store the changes.

10.1.3 Network Configuration via Meinberg Device Manager

Meinberg Device Manager

The Meinberg Device Manager software is a graphical desktop application that allows to configure Meinberg modules and assembly groups over an encrypted network connection or a local USB or serial connection. A great advantage of the Meinberg Device Manager is that various modules/assembly groups can be configured and monitored simultaneously. The Meinberg Device Manager for Windows can be used under Windows 7 and all newer versions. Supported Linux distributions include Ubuntu, Mint Linux, Debian, SUSE Linux, CentOS, and others.

The software is delivered on the USB stick included in the scope of delivery and does not need to be installed or copied on the PC. The Meinberg Device Manager can be started directly from the USB data carrier. The computer must be connected to the network in which the microSync system is connected.



The software is downloadable free of charge from our homepage:
https://www.meinbergglobal.com/english/sw/mbg-devman.htm

Information:

You can download a complete and detailed manual about the Meinberg monitoring software on our homepage:
https://www.meinbergglobal.com/download/docs/manuals/english/meinberg-device-manager.pdf

The network configuration for the microSync can be performed using Meinberg Device Manager - see chapter "Additional Software" in the microSync installation manual.

In its factory-shipped state the microSync has the following network configuration:

Netzwerkport LAN 0

IPv4 Adresse *192.168.19.79*

Netzmaske: *255.255.255.0*

Gateway: Not defined

DHCP: Disabled

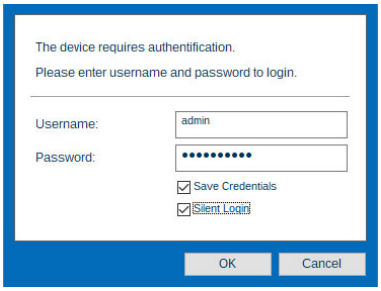
The PC on which Meinberg Device Manager is used must be able to establish a network connection with the above address in the appropriate subnet. If the PC's network configuration or the network's topology or addressing prevent a connection from being established with the microSync, the network configuration of the PC will need to be (temporarily) changed and a different physical connection may need to be established (e.g. a direct network connection).

Important!

Please ensure that any effective firewalls or other security solutions allow network traffic to pass through TCP port *10002*.

Clicking on the button "**Search Devices**" will cause all Meinberg products accessible over the network connection to be detected and then listed.

Select the device with which you wish to establish a connection. With the microSync, you will then be prompted to enter your account details. When setting the device up for the first time, please enter "*admin*" as the username and "*timeserver*" as the password.

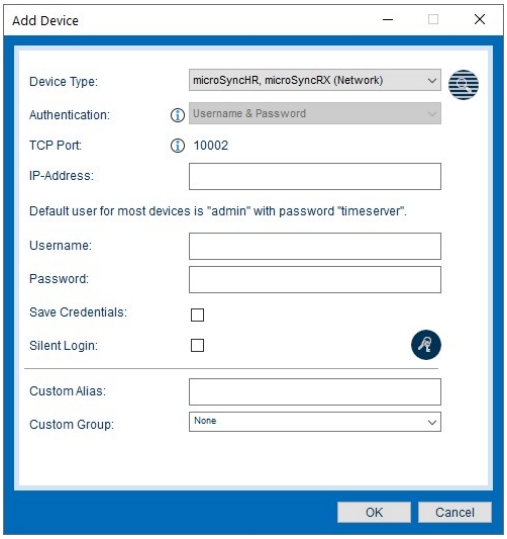


If the inserted microSync cannot be found via the automatic search, the **Add Device** button can be used to set up the connection manually.

Manual Setup

Select the connection type **microSyncHR, microSyncRX (Network)**.

Then enter the IPv4 address of the microSync (*192.168.19.79*). Enter "*admin*" as the username and "*timeserver*" as the password.



Once the network connection has been established, open the "**Network**" section of the left "**Config**" panel, then make the appropriate adjustments to the network settings. Be sure in particular to correctly configure the network settings for the intended management interface ("**Interfaces**" tab) to ensure that it is accessible within the subnet.

Once you have performed the configuration, click on "**Apply Configuration**" (the check mark) to store the changes.

10.2 Initial Start of Operation

10.2.1 Start of Operation with meinbergOS Web Interface

microSync systems with meinbergOS Version *2022.05.1* or later provide a feature-rich Web Interface that can be used to perform most configuration processes easily and also allows you to monitor your device's status and condition.

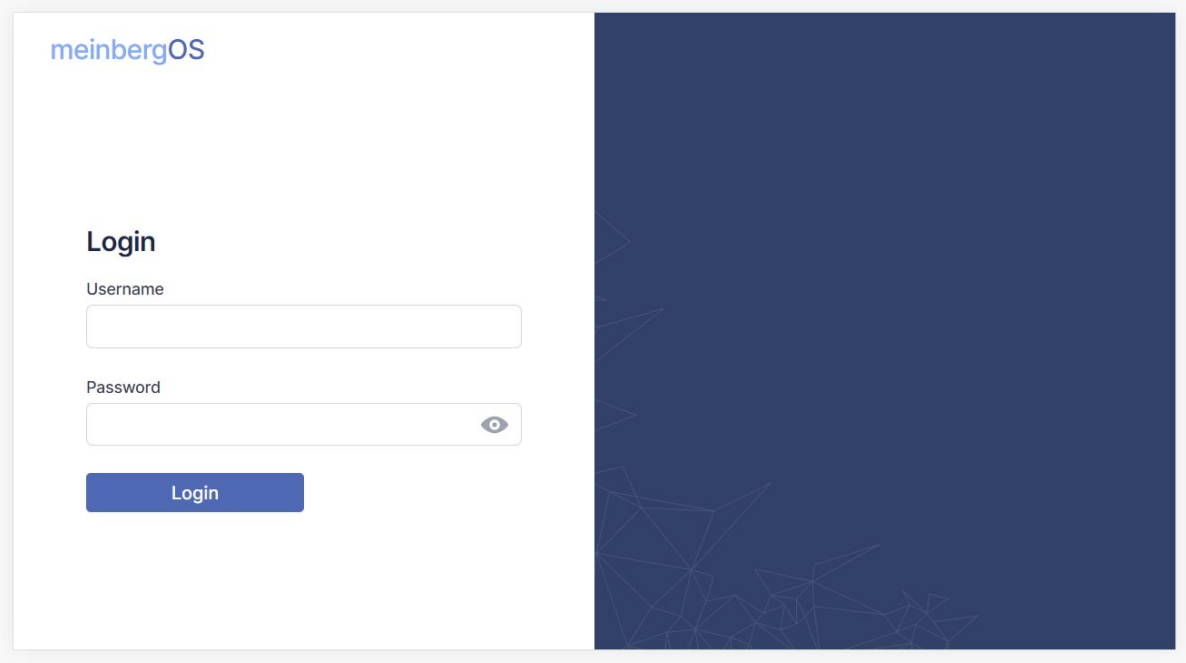


Figure 10.1: Login Page of meinbergOS Web Interface

Once you have entered the IP address of your meinbergOS device into the address bar of your web browser, the login page will appear (Figure 10.1).

The default settings are:

Username: *admin*
Password: *timeserver*

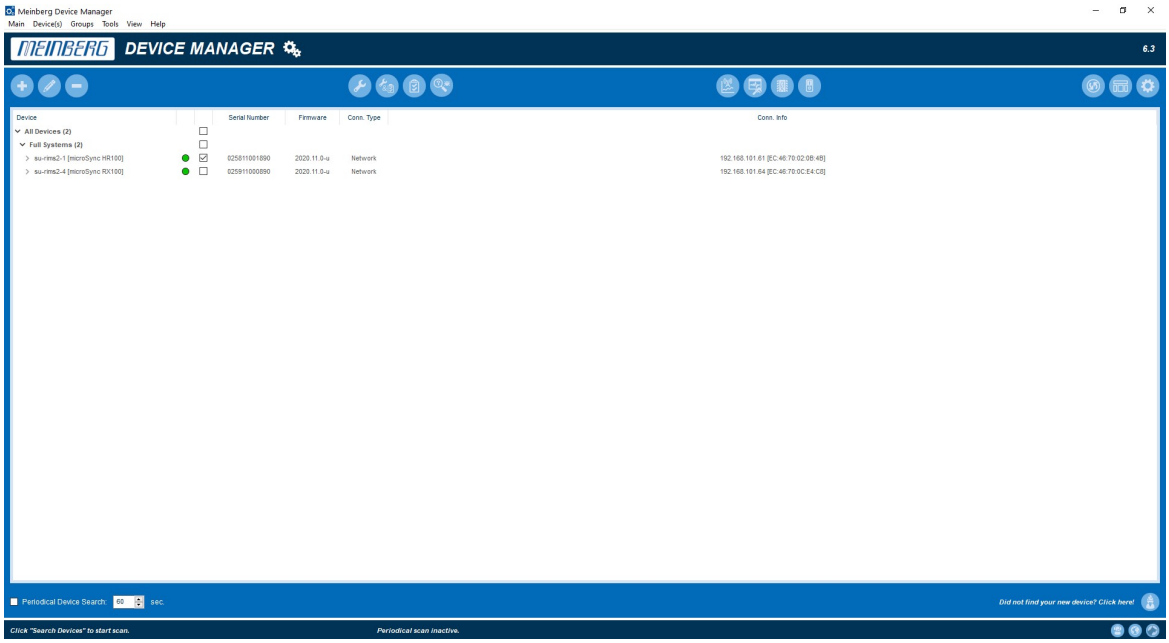
Further information about the meinbergOS web interface in the chapter "The meinbergOS Web Interface" to be found in the microSync installation manual:

https://www.meinberg.de/download/docs/manuals/english/microsync.pdf

10.2.2 Start of Operation with Meinberg Device Manager Software

First install the Meinberg Device Manager software supplied on the USB stick. After the setup, start the program. If you do not want to perform a setup on your computer, you can start the portable version of the Meinberg Device Manager software directly on the USB stick: *USB Drive/Software/MbgDevMan/mbgdevman_portable/mbgdevman.exe*.

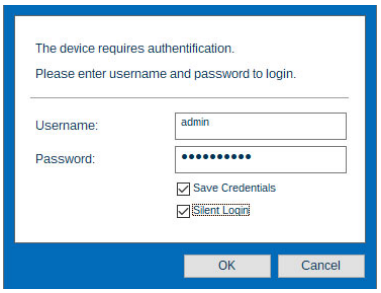
A comprehensive manual of the Meinberg Device Manager software can be downloaded here:
https://www.meinbergglobal.com/download/docs/manuals/english/meinberg-device-manager.pdf



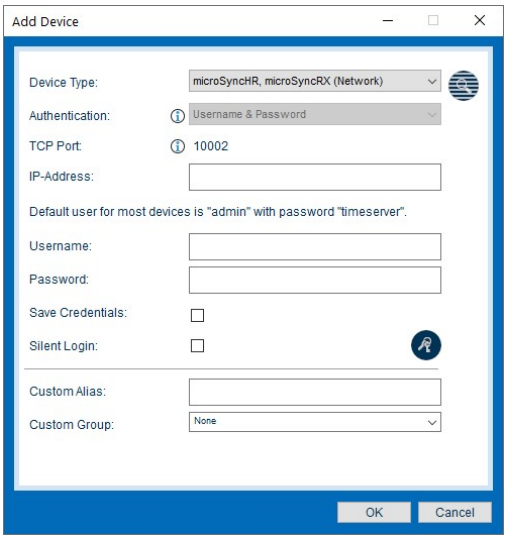
By clicking on the Search Devices button, all available microSync systems that have a serial or a network connection are recognized by the Meinberg Device Manager and will be listed then.

- Found systems are displayed with a green dot.
- Modules that are no longer recognized are displayed with a red dot.
- Modules whose password or password/user name combination is unknown will be marked with a red x.

Use the corresponding checkbox to select the device with which you want to establish a connection. With a microSync system you will then be prompted to enter your connection data. At the initial start please use "**admin**" for user and "**timeserver**" as password.



If the connected system was not found by the automatic search, a connection can be established manually by **Add Device**.



Establishing a Network Connection
Select the connection type *Network*. Then enter the IPv4 address of the system you want to connect to.

Authentication
Select the authentication option. The option Username & Password is only supported on systems with MeinbergOS.

TCP Port
The TCP port is used to communicate with your system. Please make sure that the port is not blocked by your firewall configuration.

Save Credentials
With this checkbox you ensure that the Device Manager has remembered the login for this system. When the program is restarted, the User and Password fields are already filled out.

Silent Login
You have the option that the Meinberg Device Manager does not ask for a user name and password every time you log in.

Custom Alias
Assign a custom alias for better identification of individual systems/modules in Device Manager.

Custom Group
Assign the module/assembly to a previously created group.

11 Technical Appendix

11.1 Technical Specifications microSync Chassis

Protection Rating: IP30

Ambient Temperature: -20 ... 55 °C

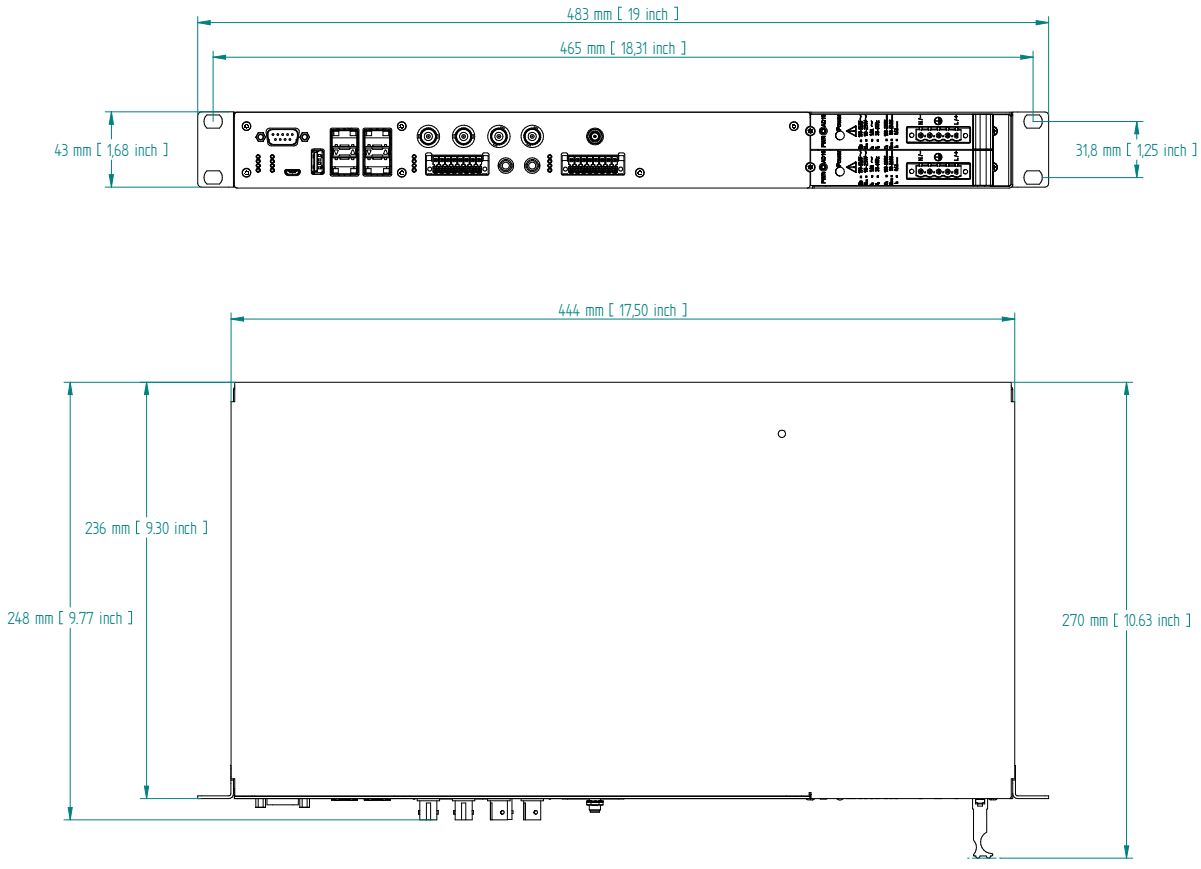
Storage Temperature: -30 ... 70 ° C

Humidity: 5% to 95% (non-condensing) @ 40 °C

Operating Altitude: up to 4,000 m (13,123 ft) above sea level

Atmospheric Pressure: 615 to 1,600 hPa

Physical Dimensions:



11.2 Technical Specifications GNSS Receiver

Time to Sychronization:
one minute with known receiver position and valid almanac
12 minutes if invalid battery buffered memory

Pulse Outputs:
HR and RX systems: eight programmable outputs (PP 1 - PP 8)
Timer, Single Shot, Cyclic Pulse, Pulse Per Second / Minute / Hour, DCF77 Marks, Position OK, Time Sync, All Sync, DCLS Time Code, Serial Time String, 10 MHz Frequency, Synthesizer Frequency, PTTI 1PPS

DC-insulated by optocouplers
U_{CEmax} = 55 V, I_{Cmax} = 50 mA, P_{tot} = 150 mW, V_{iso} = 5000 V

pulse delay: t_{on} e.g. 20 μsec (I_C = 10 mA)
t_{off} e.g. 3 μsec (I_C = 10 mA)

Accuracy of Pulses:
after synchronization and 20 minutes of operation
OCXO SQ/MQ/HQ/DHQ: better than ±50 nsec

better than ±2 μsec during the first 20 minutes of operation

Frequency Outputs:
10 MHz, TTL level into 50 Ohm
1 MHz, TTL level
100 kHz, TTL level

Frequency Synthesizer:
1/8 Hz up to 10 MHz

Accuracy of Synthesizer:
base accuracy depends on system accuracy
1/8 Hz to 10 kHz Phase syncron with pulse output P_SEC
10 kHz to 10 MHz frequency deviation < 0.0047 Hz

Synthesizer Outputs:
F_SYNTH: TTL level

Serial Ports:
asynchronous serial port RS-232
Baud Rate: 300, 600, 1200, 2400, 4800, 9600, 19200 Baud
Framing: 7E1, 7E2, 7N2, 7O1, 7O2, 8E1, 8N1, 8N2, 8O1

Default Setting:
COM 0: 19200, 8N1
Meinberg Standard time string, per second

Time Code Outputs:
Unbalanced modulated sine wave signal:
3 V_{pp} (MARK), 1 V_{pp} (SPACE) into 50 Ω

PWM DCLS-signal: TTL into 50 Ω, active-high or -low

GNS Receiver (GNS181)

Type of receiver: GPS/GLONASS/Galileo/BeiDou receiver
Number of channels: 72
Frequency band: GNSS L1
GPS: 1575.42 ±10 MHz
GLONASS: 1602-1615 MHz
Galileo: 1542.5 MHz
BeiDou: 1561.09 MHz

Antenna: Combined GPS/GLONASS antenna

3 dB Bandwidth:	1590 ±30 MHz
Impedance:	50 Ω
Gain:	40 ±4 dB

Cable length: max. 70 m low-loss cable (Belden H155)

Antenna Connector: SMA female

Power Supply for Antenna: 5 V, 100 mA - continuous short circuit protection, automatic recovery
power supply via antenna cable

GPS Receiver (GPS180)

Receiver: 12 - channel C/A code receiver with external antenna/converter unit

Antenna: antenna/converter unit with remote power supply

Cable length: max. 300 m (RG58 coax-cable)

Antenna Connector: BNC female

Power Supply for Antenna: 15 V DC, continuous short circuit protection, automatic recovery
isolation voltage 1000 VDC, provided via antenna cable

GNS-UC Receiver (GNS181-UC)

Type of receiver: 72 channel receiver
GPS/Galileo

Frequency band:

GPS:	L1C/A
Galileo:	E1B/C

Cable length: max. 300 m (RG58 coax-cable)

Antenna Connector: BNC female

Power Supply for Antenna: 15 V DC, continuous short circuit protection, automatic recovery
isolation voltage 1000 VDC, provided via antenna cable

11.3 Configuration Options

Receiver Options

RECEIVER TYPE	SIGNAL TYPE	VALUE	CONNECTOR
Meinberg GPS IF, 12-channel	IF (Meinberg Antenna))	15 V DC	BNC
Meinberg GNS-UC GPS/Galileo IF	IF (Meinberg Antenna))	15 V DC	BNC
GNSS (GPS, GLONASS, Galileo, BeiDou), 72-Channel	L1/E1/B1 Band	5 V DC	SMA

Oscillator Options

TYP	HOLDOVER PERFORMANCE (1 DAY)	HOLDOVER PERFORMANCE (1 YEAR)
OCXO SQ	+- 220 μsec	+- 4.7 sec
OCXO MQ	+- 65 μsec	+- 1.6 sec
OCXO HQ	+- 22 μsec	+- 788 msec
OCXO DHQ	+- 4.5 μsec	+- 158 msec

11.4 Protocols and Profiles

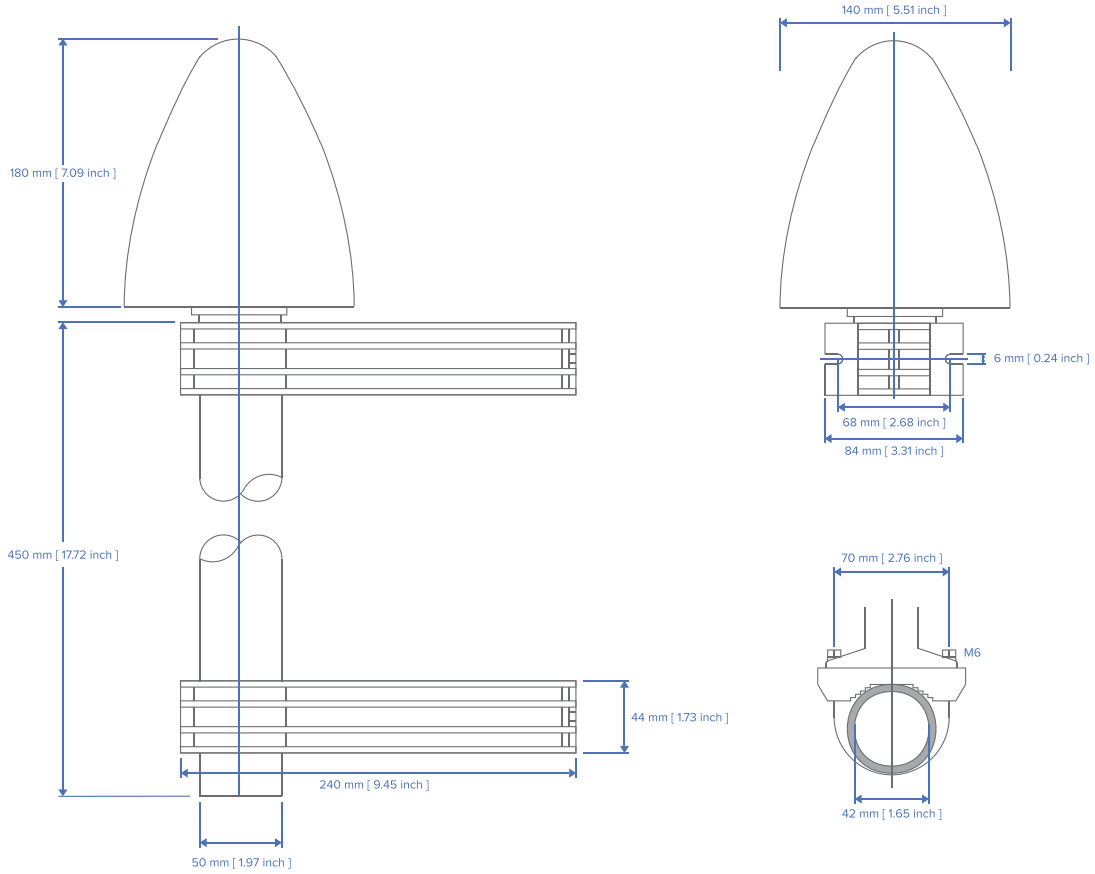
NETWORK PROTOCOLS	IEEE 1588 PROFILES
IPv4, IPv6	IEEE 1588v2 Default Profile
NTPv3, NTPv4	IEEE C.37.238-2011 Power Profile
PTPv1, PTPv2	IEEE C.37.238-2017 Power Profile
IEC 62439-3 (PRP)	IEC/IEEE 61850-9-3 Power Utility Profile
DHCP, DHCPv6	Enterprise-Profile
DSCP	ITU-T G.8265.1, ITU-T G.8275.1, ITU-T G.8275.2 Telecom Profile
IEEE 802.1q VLAN Filtering/Tagging	SMPTE ST 2059-2 Broadcast Profile
IEEE 802.1p QOS	IEEE 802.1AS TSN/AVB Profile
SNMPv1/v2/v3	AES67 Media Profile
Remote Syslog Support (UDP)	DOCSIS 3.1

11.5 Compliances

Compliance	
CB Scheme	
CE	
FCC	
UL	
CSA	
WEEE	Waste of Electrical and Electronic Equipment
RoHS	Restriction of Hazardous Substances
REACH	Registration, Evaluation, Authorization and Restriction of Chemicals

12 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 IF frequency:	10 MHz 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 °F to 176 °F)	
Weight:	1.6 kg (3.53 lbs), including mounting kit	

12.1 Technical Specifications: Antenna Cable

The table below shows which coaxial cable types and lengths are supported by Meinberg for each of the receiver types. If you need to purchase a replacement cable at any time, please refer to this table to ensure that you select cable with suitable cutoff frequency and attenuation properties.

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/DCF/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.

12.2 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

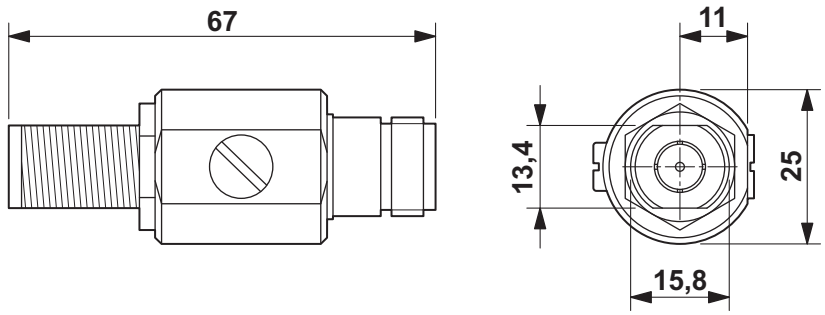
Installation Method:	Connector Type-Specific Adapter Plug	
Direction of Action:	Line Shield/Earth Ground	
Maximum Continuous Operating Voltage:	UC (Wire-Ground) 195 V AC	280 V DC
Rated Current:	I_N	5 A (25 °C)
Effective Operating Current:	IC at UC	$\leq$ 1 μA
Rated Discharge Current:	In (8/20) μs (Core-Earth) 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	

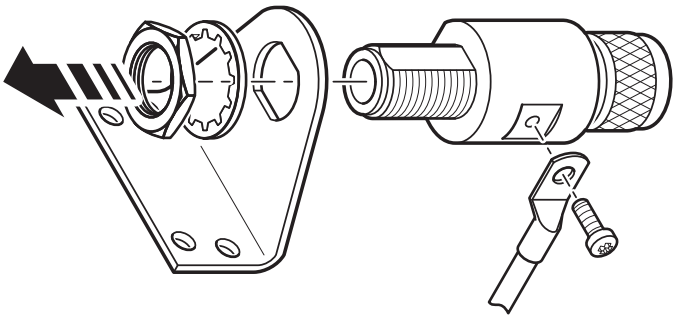
The original product page of the supplier (see link) of the CN-UB-280DC-BB surge protector is the source of the specifications above. Please refer to the manufacturer's product page at the following link for detailed specifications as well as a variety of product-specific documents:

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

12.2.1 MBG S-PRO: Physical Dimensions



12.2.2 Installation and Grounding



13 RoHS Conformity

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”.

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.

14 Declaration of Conformity for Operation in the European Union

EU-Konformitätserklärung

Doc ID: microSync RX412/AD10DC20-February 24, 2023

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

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

Produktbezeichnung *Product Designation*	**microSync RX412/AD10DC20**

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* 2014/53/EU	ETSI EN 303 413 V1.2.1 (2021-04)
EMV – Richtlinie *EMC Directive* 2014/30/EU	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-19 V2.2.1 (2022-09) DIN EN IEC 61000-6-2:2019 DIN EN IEC 61000-6-3:2021 DIN EN 55032:2015/AC:2016/A11:2020/A1:2020 DIN EN 55035:2017/A11:2020
Niederspannungsrichtlinie *Low Voltage Directive* 2014/35/EU	DIN EN IEC 62368-1:2020/A11:2020
RoHS – Richtlinie *RoHS Directive* 2011/65/EU + 2015/863/EU	DIN EN IEC 63000:2018

Bad Pyrmont, den February 24, 2023

Stephan Meinberg
Production Manager

15 Declaration of Conformity for Operation in the United Kingdom

UK Declaration of Conformity

Doc ID: microSync RX412/AD10DC20-February 24, 2023

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

declares that the product

Product Designation	**microSync RX412/AD10DC20**

to which this declaration relates, is in conformity with the following standards and provisions of the following regulations under British law:

Radio Equipment Regulations 2017 (as amended) *SI 2017/1206*	ETSI EN 303 413 V1.2.1 (2021-04)
Electromagnetic Compatibility Regulations 2016 (as amended) *SI 2016/1091*	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-19 V2.2.1 (2022-09) EN IEC 61000-6-2:2019 EN IEC 61000-6-3:2021 EN 55032:2015/AC:2016/A11:2020/A1:2020 EN 55035:2017/A11:2020
Electrical Equipment (Safety) Regulations 2016 (as amended) *SI 2016/1101*	EN IEC 62368-1:2020/A11:2020
The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (as amended) *SI 2012/3032*	EN IEC 63000:2018

Bad Pyrmont, Germany, dated February 24, 2023

Stephan Meinberg
Production Manager