TECHNICAL REFERENCE

LANTIME M300/GNS/RPS

2nd September 2019

Meinberg Radio Clocks GmbH & Co. KG
# Table of Contents

1 Imprint 1

2 Important Safety Information 2
   2.1 Important Safety Instructions and Protective Measures 2
   2.2 Used Symbols 3
   2.3 Security during Installation 5
   2.4 Protective Conductor- / Ground-Terminal 8
   2.5 Safety during Operation 9
   2.6 Safety during Maintenance 10
   2.7 Handling Batteries 10
   2.8 Cleaning and Care 11
   2.9 Prevention of ESD Damage 11
   2.10 Return of Electrical and Electronic Equipment 12

3 Global Information LANTIME M300/GNS 13

4 Technical Specifications LANTIME Chassis 14

5 LANTIME M300 - Front connectors 15

6 M300 - Rear connectors 17
   6.1 AC/DC Power Supply 17
   6.2 RS232 COMx Timestring 19
   6.3 Error Relay 20
   6.4 GNSS Antenna 21
   6.5 Pulse Per Second Output 22
   6.6 10MHz Frequency Output 22
   6.7 10/100Base-T Network Port (IEEE 803.2) 22

7 GNSS Satellite Navigation 23
   7.1 Time Zone and Daylight Saving 24

8 Available GNSS Antennas 25
   8.1 40dB Multi GNSS Timing Antenna with Integrated Lightning Protection 25
   8.2 GNSS Antenna for Stationary Installation 26
   8.3 RV-76G GPS/GLONASS Antenna for mobile Applications 27

9 WEEE Compliance 29

10 Declaration of Conformity 30
1 Imprint

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

Phone: + 49 (0) 52 81 / 93 09 - 0
Fax: + 49 (0) 52 81 / 93 09 - 230

Internet: https://www.meinbergglobal.com
Mail: info@meinberg.de

Date: 2019-03-15
2 Important Safety Information

2.1 Important Safety Instructions and Protective Measures

The following safety instructions must be respected in all operating and installation phases of the device. Non-observance of safety instructions, or rather special warnings and operating instructions in product manuals, violates safety standards, manufacturer instructions and proper usage of the device. Meinberg Funkuhren shall not be responsible for any damage arising due to non-observance of these regulations.

Depending on your device or the installed options some information is not valid for your device.


If a procedure is marked with the following signal words, you may only continue, if you have understood and fulfilled all requirements. In this documentation dangers and indications are classified and illustrated as follows:

DANGER!
The signal word indicates an imminently hazardous situation with a high risk level. This notice draws attention to an operating procedure or similar proceedings, of which a non-observance may result in serious personal injury or death.

WARNING!
The signal word indicates a hazard with a medium risk gradient. This notice draws attention to an operating procedure, a procedure or the like which, if not followed, can lead to serious injuries, possibly resulting in death.

CAUTION!
The signal word indicates a hazard with a low risk gradient. This notice draws attention to an operating procedure, a procedure or the like which, if not followed, can lead to minor injuries.

ATTENTION!
This notice draws attention to an operating procedure, a procedure or the like which, if not followed, can cause damage to the product or loss of important data.
2.2 Used Symbols

The following symbols and pictograms are used in this manual. To illustrate the source of danger, pictograms are used, which can occur in all hazard classes.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Beschreibung / Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>♂</td>
<td>IEC 60417-5031 Gleichstrom / Direct current</td>
</tr>
<tr>
<td>∼</td>
<td>IEC 60417-5032 Wechselstrom / Alternating current</td>
</tr>
<tr>
<td>↓</td>
<td>IEC 60417-5017 Erdungsanschluss / Earth (ground) terminal</td>
</tr>
<tr>
<td>✪</td>
<td>IEC 60417-5019 Schutzleiteranschluss / Protective earth (ground) terminal</td>
</tr>
<tr>
<td>⚠️</td>
<td>ISO 7000-0434A Vorsicht / Caution</td>
</tr>
<tr>
<td>🔴</td>
<td>IEC 60417-6042 Vorsicht, Risiko eines elektrischen Schlages / Caution, risk of electric shock</td>
</tr>
<tr>
<td>⚠️</td>
<td>IEC 60417-5041 Vorsicht, heiße Oberfläche / Caution, hot surface</td>
</tr>
<tr>
<td>🔴</td>
<td>IEC 60417-6056 Vorsicht, Gefährlich sich bewegende Teile / Caution, moving fan blades</td>
</tr>
<tr>
<td>🔴</td>
<td>IEC 60417-6172 Trennen Sie alle Netzstecker / Disconnection, all power plugs</td>
</tr>
<tr>
<td>🔴</td>
<td>IEC 60417-5134 Elektrostatisch gefährdete Bauteile / Electrostatic Sensitive Devices</td>
</tr>
<tr>
<td>📝</td>
<td>IEC 60417-6222 Information generell / Information general</td>
</tr>
<tr>
<td>🚫</td>
<td>2012/19/EU Dieses Produkt fällt unter die B2B Kategorie. Zur Entsorgung muss es an den Hersteller übergeben werden. This product is handled as a B2B category product. In order to secure a WEEE compliant waste disposal it has to be returned to the manufacturer.</td>
</tr>
</tbody>
</table>
The manuals for a product are included in the scope of delivery of the device on a USB stick. The manuals can also be obtained via the Internet. Enter www.meinbergglobal.com into your browser, then enter the corresponding device name in the search field at the top.

This manual contains important safety instructions for the installation and operation of the device. Please read this manual completely before using the unit.

This device may only be used for the purpose described in this manual. In particular, the given limits of the device must be observed. The safety of the installation in which the unit is integrated is the responsibility of the installer!

Non-observance of these instructions can lead to a reduction in the safety of this device!

Please keep this manual in a safe place.

This manual is intended exclusively for electricians or persons trained by an electrician who are familiar with the applicable national standards and safety rules. Installation, commissioning and operation of this device may only be carried out by qualified personnel.
## 2.3 Security during Installation

### WARNING!

**Preparing for Commissioning**

This built-in unit has been designed and examined according to the requirements of the standard IEC 60950-1 „Information Technology Equipment - Safety“.

When the built-in unit is used in a terminal (e.g., housing cabinet), additional requirements according to Standard IEC 60950-1 must be observed and complied with. In particular, the general requirements and the safety of electrical equipment (such as IEC, VDE, DIN, ANSI) as well as the applicable national standards are to be observed.

The device has been developed for use in the industrial sector as well as in residential areas and can only be used in such environments. For environments with higher levels of soiling, additional measures, e.g. Installation in an air-conditioned control cabinet required.

**Transport, Unpacking, Installation**

If the unit is brought into the operating room from a cold environment, condensation may occur, wait until the unit is temperature-controlled and absolutely dry before operating it.

When unpacking, setting up, and before operating the equipment, be sure to read the information on the hardware installation and the specifications of the equipment. These include, for example, dimensions, electrical characteristics, and necessary ambient and climatic conditions, etc.

The fire protection must be ensured in the installed state.

For mounting, the housing must not be damaged. No holes may be drilled in the housing.

For safety reasons, the device with the highest mass should be installed in the lowest position of the rack. Other devices must be placed from the bottom to the top.

The device must be protected against mechanical stress such as vibration or shock.
Connecting Data Cables
During a thunderstorm, data transmission lines must not be connected or disconnected (risk of lightning).

When wiring the devices, the cables must be connected or disconnected in the order of the arrangement described in the user documentation accompanying the device. Always attach all cables to the plug during connection and removal. Never pull the cable itself. Pulling the cable can cause the cables to disconnect from the plug.

Install the cables in way that they do not constitute a hazard (danger of tripping) and are not damaged, i.e. kinked.

Connecting Power Supply
This equipment is operated at a hazardous voltage. Non-observance of the safety instructions in this manual may result in serious personal injury or property damage.

Before connecting to the power supply, a grounding cable must be connected to the earth connection of the device.

Before operation, check that all cables and lines work properly and are undamaged. Pay particular attention to the facts that the cables do not have kinks or that they are not too short around corners, and no objects are placed on the cables. Also make sure that all connections are secure.

Faulty shielding or cabling will endanger your health (electrical shock) and may destroy other equipment.

Ensure that all necessary safety precautions have been taken. Make all connections to a unit before turning on the power. Observe the safety instructions on the device (see safety symbols).

The metal housing of the device is grounded. It must be ensured that enough air and creepage distances to neighboring voltage-carrying parts are provided during assembly in the control cabinet and no short circuits are caused.

In the case of malfunctions or servicing (e.g. in the event of a damaged housing or power cable or when fluids or foreign objects enter), the current flow can be interrupted. Questions about the house installation, need to be clarified with your house administration.

The power supply should be connected with a short, low-inductance line.
**AC Power Supply**

- The device is a device of protection class 1 and may only be connected to a grounded outlet (TN system).
- For safe operation, the device must be protected by an installation fuse of max. 16 A and equipped with a residual current circuit breaker in accordance with the applicable national standards.
- The unit must always be disconnected from the mains and not from the appliance.
- Devices with mains plugs are equipped with a safety-tested mains cable of the country of use and may only be connected to a grounded shockproof socket, otherwise electric shock may occur.
- Make sure that the mains socket on the appliance or the mains socket of the house installation is freely accessible to the user so that the mains cable can be pulled out of the socket in case of emergency.

**DC Power Supply**

- Outside the assembly group the device must be disconnectable from the power supply in accordance with the provisions of IEC 60950-1 (e.g. by the primary line protection).
- Installation and disassembly of the power supply plug is only permitted if the assembly group is switched off (e.g. by the primary line protection).
- The supply lines must be adequately secured and dimensioned.

*Connection Cross Section:*

- 1 mm² – 2.5 mm²
- 17 AWG – 13 AWG

- The device must be supplied with a suitable disconnector (switch). The separation device must be easily accessible, placed near the device and marked as a separation device for the unit.
2.4 Protective Conductor- / Ground-Terminal

ATTENTION!

In order to ensure safe operation 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 earth connection is provided on the housing, it must be connected to the equipotential bonding rail (grounding rail). The mounting parts (without cable) are not included in the scope of delivery.

Note:
Please use a grounding cable $\geq 1.5 \text{ mm}^2$
Always pay attention to a correct crimp connection!
2.5 Safety during Operation

WARNING!

Avoiding Short-Circuits
Make sure not to get any objects or liquids inside the unit. Electric shock or short circuit could result.

Ventilation Slots
Make sure that the ventilation slots are not covered or dusty, as there is a danger of overheating during operation. Disturbances during operation can result.

Normal Operation
The normal operation and the observance of the EMC limits (electromagnetic compatibility) are only ensured if the housing cover is properly installed and when the doors are closed (cooling, fire protection, shielding against electrical, magnetic and electromagnetic fields).

Switch off in fault / service case
By switching off, the devices are not disconnected from the power supply. In the event of a fault or service case, the devices must be immediately disconnected from all power supplies.

Follow the steps below:
- Switch off the device
- Disconnect all power plugs
- Inform the service
- Devices that are connected via one or more uninterruptible power supplies (UPS) remain operational even when the UPS power cord is disconnected. Therefore, you must put the UPS out of operation according to the documentation of the corresponding user documentation.
2.6 Safety during Maintenance

**WARNING!**

When you are expanding the device, use only device parts that are approved for the system. Non-observance may result in injury to the EMC or safety standards and cause malfunction of the device.

If device parts, which are released for the system, are extended or removed there may be a risk of injury in the area of the hands, due to the pull-out forces (approx. 60 N).

The service informs you which device parts may be installed.

The device must not be opened, repairs to the device may only be carried out by the manufacturer or by authorized personnel. Improper repairs can result in considerable danger to the user (electric shock, fire hazard).

Unauthorized opening of the device or of individual parts of the device can also lead to considerable risks for the user and result in a loss of warranty as well as an exclusion of liability.

- Danger due to moving parts – keep away from moving parts.
- Device parts can become very hot during operation. Do not touch these surfaces! If necessary, switch off the unit before installing or removing any equipment, and allow it to cool down.

2.7 Handling Batteries

**CAUTION!**

The lithium battery on the receiver modules has a service life of at least 10 years. If an exchange is necessary, the following notes must be observed:

The device is equipped with a lithium battery. The battery must not be short-circuited or recharged. Replacement of the lithium battery may only be carried out by the manufacturer or authorized personnel.

Risk of explosion if the battery is not replaced correctly. Replace only with the same or equivalent type recommended by the manufacturer.

When disposing used batteries, observe the local regulations for the disposal of hazardous waste.
2.8 Cleaning and Care

**ATTENTION!**

Do not wet clean the appliance! Penetrating water can cause considerable dangers to the user (e.g., electric shock).

Liquid can destroy the electronics of the device! Liquid penetrates into the housing of the device and can cause a short circuit of the electronics.

Only clean with a soft, dry cloth. Never use solvents or cleaners.

2.9 Prevention of ESD Damage

**ATTENTION!**

The designation ESD (Electrostatic Sensitive Devices) refers to measures which are used to protect electrostatically endangered components from electrostatic discharge and thus to prevent destruction. Systems and assemblies with electrostatically endangered components usually have the following characteristics:

**Indicator for assemblies with electrostatic endangered components**

The following measures protect electrostatically endangered components from destruction:

- Prepare removal and installation of assemblies
- Unload yourself (for example, by touching a grounded object) before touching assemblies.
- Ensure that you wear a grounding strap on the wrist when working with such assemblies, which you attach to an unpainted, non-conductive metal part of the system.
- Use only tools and devices that are free from static electricity.

**Transporting Assemblies**

Assemblies may only be touched at the edge. Do not touch any pins or conductors on assemblies.

**Installing and Removing Assemblies**

Do not touch persons who are not grounded while removing or installing components. This could result in a loss of grounding protection from your electrostatic discharge.

**Storing Assemblies**

Always keep assemblies in ESD protective covers. These protective covers must be undamaged.

ESD protective covers, which are extremely wrinkled or even have holes, no longer protect against electrostatic discharge.

ESD protective covers must not be low-resistance and metallically conductive if a lithium battery is installed on the assembly.
2.10 Return of Electrical and Electronic Equipment

ATTENTION!

WEEE Directive on Waste Electrical and Electronic Equipment 2012/19 / EU
(WEEE Waste Electrical and Electronic Equipment)

Separate Collection
Product Category: According to the device types listed in the WEEE Directive, Appendix 1, this product is classified as an IT and communication device.

This product meets the labeling requirements of the WEEE Directive. The product symbol on the left indicates that this electronic product must not be disposed of in domestic waste.

Return and Collection Systems
For returning your old equipment, please use the country-specific return and collection systems available to you or contact Meinberg.

The withdrawal may be refused in the case of waste equipment which presents a risk to human health or safety due to contamination during use.

Return of used Batteries
Batteries marked with one of the following symbols may not be disposed of together with the household waste according to the EU Directive.
3 Global Information LANTIME M300/GNS

The LANTIME (Local Area Network Time Server) provides a high precision time base to a TCP/IP network (Stratum-1-Server). The NTP (Network Time Protocol) is used to synchronize all NTP clients with the reference. The several LANTIME variants differ from each other by the time reference and output configuration. A GPS or GNSS (GPS, GLONASS, Galileo, BeiDou) receiver, GNS-UC (only GPS and Galileo), a long wave receiver (like DCF77, MSF or WWVB) or an IRIG time code receiver can be integrated as an internal reference as well as a combination of these references (hybrid system). External references are also possible.

The LANTIME system is a set of equipment composed of an integrated GNS receiver, a single-board computer and a power supply, all installed in a metal 19 inch modular chassis and ready to operate. A simplified LINUX operating system is installed on the single-board computers flash disk. Eight push buttons and a display can be used to configure and monitor the time server.

After the network connection has been established the time server can also be configured and monitored remotely from a workstation via TELNET or FTP. An integrated web server enables access to the LANTIME by using an ordinary web browser.
# 4 Technical Specifications LANTIME Chassis

**Protection**
**Rating:** IP20

**Power**
**Consumption:**
- Base configuration: 30 W
- (max. 50 W - depending on the integrated module options)

**Ambient Temperature:** 0 ... 50 °C

**Storage Temperature:** -20 ... 70 °C

**Humidity:** max. 85% (non-condensing) @ 30 °C

---

**External Ground Connection on the Housing**

This connector must be wired to an equipotential bonding bar (earthing bar). Connection is possible on both sides of the housing. The mounting parts (without cable) are included in the scope of delivery.
1. The main menu is displayed after switching on the device and having completed the initialization phase. In the main menu the most important status information are displayed. In the top line of the display the operating mode of the reference clock / reference time is shown. Instead of "GNS: NORMAL OPERATION" the messages, "GNS: COLD BOOT", "GNS: WARM BOOT" or "GNS: UPDATE ALMANAC" can appear. In case the antenna connection is interrupted, the following message is shown: "GNS: ANTENNA FAULTY".

2. By using the 4 arrows and the "ESC", "F1" and "F2" buttons of the keypad you can navigate through each menu in the display. You can always return to the main menu by pressing the "ESC" button several times.
3. **“Ref. Time”**
green: the reference clock (e.g. build-in GNS) provides a valid time  
red: the reference clock does not provide a valid time

**“Time Service”**
green: NTP is synchronized to the reference clock, e.g. GNS  
red: NTP is not synchronized or switched to the ‘local clock’

**“Network”**
green: all monitored network interfaces are connected (‘Link up’)  
red: at least one of the monitored network interfaces is faulty

**“Alarm”**
off: no error  
red: general error

4. To connect a serial terminal use the 9 pin SUBD RS232 connector in the front panel. Via the serial terminal connection it is possible to configure the parameters with a terminal program. To establish a connection between the LANTIME and a PC, use a NULL-MODEM cable. Configure your terminal program with 38400 Baud, 8 Databits, no parity and one Stopbit (8N1). The terminal emulation has to be set to VT100. After connecting to the time server the login message will be displayed. Enter user name and password:

Default User: *root*; Password: *timeserver*

5. All devices of the LANTIME M-Series dispose a USB interface, which can be used to plug in a USB Stick. The USB Stick can be deployed for the following tasks:

- to lock the keys on the LC-Display, to prevent unauthorized access
- to save the LANTIME configuration
- to transfer the configuration between several LANTIMES
- to save log files
6.1 AC/DC Power Supply

Hotplug
It is possible to remove or install a power supply unit from the equipment terminal during operation.

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 status LED of the new power supply should now light up and an "OK" status should be displayed in the system's web interface.
Checking Power Status
The status of the power supplies can be viewed in the web interface under “System → Redundant Power Supply” (depending on the equipment, i.e. if one or two power supplies are installed, the web interface displays this status).

Connector Type: 5-pol. DFK

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

Input Parameter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Voltage Range:</td>
<td>$U_N = 100\text{-}240$ V ~ $100\text{-}200$ V</td>
</tr>
<tr>
<td>Maximum Voltage Range:</td>
<td>$U_N = 90\text{-}254$ V ~ $90\text{-}240$ V</td>
</tr>
<tr>
<td>Nominal Current:</td>
<td>$I_N = 1.0$ A ~ $0.6$ A</td>
</tr>
<tr>
<td>Nominal Frequency Range:</td>
<td>$f_N = 50\text{-}60$Hz</td>
</tr>
<tr>
<td>Maximum Frequency Range:</td>
<td>$f_{max} = 47\text{-}63$Hz</td>
</tr>
</tbody>
</table>

Output Parameter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Power:</td>
<td>$P_{max} = 50$ W</td>
</tr>
<tr>
<td>Max. Heat Emission:</td>
<td>$E_{therm} = 180.00$ kJ/h (170.61 BTU/h)</td>
</tr>
</tbody>
</table>

WARNING!
This equipment is operated at a hazardous voltage.

Danger to life due to electrical shock!
- Only qualified personnel (electricians) may connect the device.
- Never work with open terminals and plugs while the power is on.
- All connectors must be protected against touching live parts with a suitable plug housing!

- Note: Always ensure safe wiring!
- Important: The device must be connected to a proper grounding (PE).
6.2 RS232 COMx Timestring

Data transfer: serial

Baudrate/framing: 19200 / 8N1 (default)

Timestring: Meinberg Standard (default)

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

Connection type: D-SUB female 9pin.

Cable: data cable (shielded)
       PC connector 1:1
6.3 Error Relay

On the back panel of the device you can find a DFK connector labeled "Error". This relay output is connected to the TTL TIME_SYNC output of the reference clock (GPS, PZF, TCR, ...). If the internal reference clock has been synchronized by its source (GPS, DCF77 or IRIG) the relay will switch to mode "NO". In case of bad antenna signal or the device has been switched off the relay falls back to mode "NC".

Technical Specification

Switching Voltage max.: 125 V DC
140 V AC

Switching Current max.: 1A

Switching Load max.: DC 30 W
AC 60 VA

Switching Current UL/CSA: 0.46 A 140 V AC
0.46 A 65 V DC
1A 30 V DC

Response Time: ca. 2ms

WARNING!
This equipment is operated at a hazardous voltage.

Danger to life due to electrical shock!
- Never work with open terminals and plugs while the power is on!
- When working on the connectors of the error relay cable, always remove both sides of the cable from the respective devices!
- Dangerous voltages can occur at the terminal of the fault signal relay! Work on the terminal of the fault signal relay must never be carried out with the signal voltage present!
### 6.4 GNSS Antenna

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antenna type</strong></td>
<td>Multi GNSS L1 antenna with integrated lightning protection</td>
</tr>
<tr>
<td><strong>Receiver type</strong></td>
<td>72-channel GPS/Galileo/Glonass/Beidou</td>
</tr>
<tr>
<td><strong>Frequency band</strong></td>
<td>L1 / E1 / B1 , 1575.42 +/− 10 MHz / 1602-1615 MHz</td>
</tr>
<tr>
<td><strong>Signal gain</strong></td>
<td>40 dB</td>
</tr>
<tr>
<td><strong>Antenna gain</strong></td>
<td>$\geq 3.5 \text{ dBiC} / \geq 3 \text{ dBiC}$</td>
</tr>
<tr>
<td><strong>Nominal impedance</strong></td>
<td>50 Ohm</td>
</tr>
<tr>
<td><strong>Connection type</strong></td>
<td>SMA female</td>
</tr>
<tr>
<td><strong>Cable</strong></td>
<td>shielded coaxial line</td>
</tr>
<tr>
<td><strong>Cable length</strong></td>
<td>deductible up to max. 70m with Belden H155 coaxial cable</td>
</tr>
</tbody>
</table>

**WARNING!**

Working on the antenna system during thunderstorms

**Danger to life due to electrical shock!**
- Do not carry out any work on the antenna system or the antenna cable if there is a risk of a lightning strike.
- Do not carry out any work on the antenna system if the safety distance to free lines and sequential circuits is exceeded.
6.5 Pulse Per Second Output

Output signal: PPS (pulse per second)
Signal level: TTL 2.5 V into 50 Ohm
Pulse length: 200 ms
Connection type: BNC, female
Cable: shielded coax line

6.6 10MHz Frequency Output

Output signal: 10MHz frequency
Signal level: TTL, 2.5 V into 50 Ohm
Connector: BNC, female
Cable: shielded coax line

6.7 10/100Base-T Network Port (IEEE 803.2)

Output signal: 100Base-T
Data transmission speed: 10/100 MBit/s
Connection type: 8P8C (RJ45)
Cable: Copper twisted pair, e.g. CAT 5.0
Duplex Modes: Half/Full/Autonegotiation
7 GNSS Satellite Navigation

The satellite receiver clock GNS has been designed to provide extremely precise time to its user. The clock has been developed for applications where conventional radio controlled clocks can’t meet the growing requirements in precision. High precision available 24 hours a day around the whole world is the main feature of the new system which receives its information from the satellites of the Russian GLONASS (GLObal NAvigation Satellite System) and the American GPS (Global Positioning System).

GPS and GLONASS are satellite-based radio-positioning, navigation, and time-transfer systems. They are based on accurately measuring the propagation time of signals transmitted from satellites to the user’s receiver. A fully operational constellation of more than 24 satellites together with several active spares in six (GPS) respectively three (GLONASS) orbital planes in 20183 km (GPS) respectively 19100 km (GLONASS) over ground provides a minimum of four satellites to be in view 24 hours a day at every point of the globe. Four satellites need to be received simultaneously if both receiver position (x, y, z) and receiver clock offset from GPS/GLONASS system time must be computed. All the satellites are monitored by control stations which determine the exact orbit parameters as well as the clock offset of the satellites’ on-board atomic clocks. These parameters are uploaded to the satellites and become part of a navigation message which is retransmitted by the satellites in order to pass that information to the user’s receiver.

The high precision orbit parameters of a satellite are called ephemeris parameters whereas a reduced precision subset of the ephemeris parameters is called a satellite’s almanac. While ephemeris parameters must be evaluated to compute the receiver’s position and clock offset, almanac parameters are used to check which satellites are in view from a given receiver position at a given time. Each satellite transmits its own set of ephemeris parameters and almanac parameters of all existing satellites.

GPS was installed by the United States Department of Defense and provides two levels of accuracy: The Standard Positioning Service (SPS) and the Precise Positioning Service (PPS). While PPS is encrypted and only available for authorized (military) users, SPS has been made available to the general public.

GLONASS was developed to provide real-time position and velocity determination, initially for use by the Soviet military in navigating and ballistic missile targeting. Also GLONASS satellites transmit two types of signals: a Standard Precision (SP) signal and an obfuscated High Precision (HP) signal.

The BeiDou Navigation Satellite System (BDS) is a Chinese satellite navigation system. The second generation of the system, officially called the BeiDou Navigation Satellite System (BDS) and also known as COMPASS or BeiDou-2, will be a global satellite navigation system consisting of 35 satellites, and is under construction as of January 2015. It became operational in China in December 2011, with 10 satellites in use, and began offering services to customers in the Asia-Pacific region in December 2012. It is planned to begin serving global customers upon its completion in 2020.

Galileo is the global navigation satellite system (GNSS) that is currently being created by the European Union (EU) through the European Space Agency (ESA) and the European GNSS Agency (GSA). The use of basic Galileo services will be free and open to everyone.

The complete 30-satellite Galileo system (24 operational and 6 active spares) is expected by 2020. At an altitude of 23,222 km above the Earth’s surface, the satellites require about 14 hours for one orbit.
7.1 Time Zone and Daylight Saving

GPS system time differs from the universal time scale (UTC) by the number of leap seconds which have been inserted into the UTC time scale since GPS was initiated in 1980. The current number of leap seconds is part of the navigation message supplied by the satellites, so the internal real time of the GNS is based on UTC time scale. Conversion to local time and annual daylight saving time can be done by the receiver’s microprocessor if the corresponding parameters are set up by the user.
8 Available GNSS Antennas

For our combined GPS/GLONASS/Galileo/BeiDou satellite receivers, there are two available antennas, which are designed for different tasks or applications. Our standard accessory includes a Multi GNSS antenna, which is optimized for stationary operation.

For mobile applications, such as motor vehicles, ships, trains and planes we recommend the use of the RV-76G, an active GNSS antenna, suitable for direct mounting into an enclosure (chassis, panels, etc.).

8.1 40dB Multi GNSS Timing Antenna with Integrated Lightning Protection

GPS L1 / GLONASS L1 / GALILEO E1 / BeiDou B1 Frequency Band
The GPS, GLONASS, Galileo and BeiDou satellites are not stationary but circle round the globe in a period of about 12 hours. They can only be received if no building is in the line-of-sight from the antenna to the satellite, so the antenna unit must be installed in a location with a free view to the sky. The best reception is given when the antenna has a free view of 8° angular elevation above horizon. If this is not possible the antenna should be installed with a mostly free view to the equator because of the satellite courses which are located between latitudes of 55° North and 55° South. If even this is not possible problems occur especially when at least four satellites for positioning have to be found.

The active L1 timing reference antenna is specifically designed for long-lasting, trouble-free deployments for a variety of applications. The low noise, high gain amplifier is well suited to address attenuation issues. The proprietary quadrifiliar helix design, coupled with multistage filtering provides superior out-of-band rejection and lower elevation pattern performance than traditional patch antennas.

- Their unique radome shape sheds water and ice, while eliminating problems associated with bird perching.
- This antenna is made of materials that fully comply with provisions stipulated by EU directives RoHS 2002/95/EC.
- The antenna provides integrated lightning protection capability.
- The antenna also features ESD, reverse polarity protection and transit voltage suppression.

A standard coaxial cable with 50 ohm impedance should be used to connect the antenna to the receiver. The max. length of cable between antenna and receiver is 50 meters (H155 - Low-Loss).

See datasheet

"40 dB GPS Multi GNSS Timing Antenna with Integrated Lightning Protection (ptel_gpsl1gL.pdf)

or download this document:

Multi GNSS Antenna

http://www.meinbergglobal.com/download/docs/other/ptel_gpsl1gL.pdf
8.2 GNSS Antenna for Stationary Installation

The Multi GNSS Antenna is an active GNSS antenna which can receive the signals of the GPS, GLONASS, Galileo and Beidou satellite systems. It is very well suited for stationary installations, operates with a 5V DC supply voltage provided by the receiver, and has an integrated surge protection.

The antenna cable length can be up to 70 meters if a H155 low-loss coaxial cable is used.

Mounting and Installation of the GNSS/L1 Antenna

**WARNING!**
Antenna mounting without effective anti-fall protection

**Danger to life due to fall!**
- Pay attention to effective working safety when installing antennas!
- Never work without an effective anti-fall equipment!

**WARNING!**
Working on the antenna system during thunderstorms

**Danger to life due to electrical shock!**
- Do not carry out any work on the antenna system or the antenna cable if there is a risk of a lightning strike.
- Do not carry out any work on the antenna system if the safety distance to free lines and sequential circuits is exceeded.
8.3 RV-76G GPS/GLONASS Antenna for mobile Applications

Features
- Low noise figure
- Fully weather proof
- Excellent temperature stability
- High sensitivity

The RV-76G GPS/GLONASS antenna is the integration of a high performance GPS patch antenna and a state-of-the-art low noise amplifier into a very low-profile, extremely compact and fully waterproof enclosure which, when connected to a GPS receiver with 5 V DC antenna power, provide adequate signal amplification and out-band rejection.

The flat design and the robustness of the case make the RV-76G to one of the most popular antennas on the vehicle navigation and marine market.

Figure: RV-76G with Mounting Kit

Technical Drawing
 Physical Characteristics
Construction: Polycarbonate radome detachable cable/connector for easy mount, rubber-O-rig between top radome and screw base for waterproof.

Dimensions: 60 mm in Diameter x 38 mm in height
Weight: 125 g (Excluding cable and connector)
Color: Standard in ivory white
Mounting: Bulkhead mount with 0.8 inch threaded wing nut

Antenna Element
Center frequency: 1575.42 MHz ± 10 MHz & 1602 MHz ± 8 MHz
Polarization: R.H.C.P. (Right Hand Circular Polarization)

Gain at Zenith: +1.5 dBi typ.
Axial Ratio: 3 dB max.

mounted on the 70mm x 70mm square ground plane

Low Noise Amplifier
Gain: 27 dB @ 3V typ.
Band Width: 43 MHz min. @ 511 ≤-10 dB
Noise Figure: 1.5 typ.
Supply Voltage: +2.5 ~ 5 V DC
Current consumption: 3 V DC : 10.6 mA typ. / 5.0 V DC : 21 mA typ.
Impedance: 50 Ohm

Cable & Connector
RF cable: 5 m RG174/U (standard)
Pulling strength: 6 Kg @ 5 sec. With molded plastics on connector for strain relief

Overall performance (antenna element, LNA & cable)
Center frequency: 1575.42 MHz ± 10 MHz & 1602 MHz ± 8 MHz
Gain: At 90° 27 + 3dB (cable loss)
Note: Mounted on the 70mm x 70mm square ground plane

Environmental Conditions
Operating temperature: ~ 40°C + 85°C
Storage temperature: ~ 40°C + 90°C
Relative humidity: 95% non-condensing

Source: Datasheet gps-glonass_antenna_rv-76g_catalog_v1.pdf (Sanav)
9 WEEE Compliance

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

We hereby declare that this product is conform to the European Directive 2011/65/EC, “Restrictions of Hazardous Substances in Electrical and Electronic Equipment”. We ensure that electrical and electronic products sold in the EU do not contain lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls (PBBs), and polybrominated diphenyl ethers (PBDEs) above the legal threshold.

WEEE status of the product

This product is handled as a B2B (Business to Business) category product. In order to secure a WEEE compliant waste disposal it has to be returned to the manufacturer. Any transportation expenses for returning this product (at its end of life) have to be incurred by the end user, whereas Meinberg will bear the costs for the waste disposal itself.
10 Declaration of Conformity

Konformitätserklärung
Doc ID: LANTIME M300/GNS/RPS-2019-03-15

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
LANTIME M300/GNS/RPS

auf das sich diese Erklärung bezieht, mit den folgenden Normen und Richtlinien übereinstimmt:
to which this declaration relates is in conformity with the following standards and provisions of the directives:

RED – Richtlinie
RED – Directive
ETSI EN 303 413 V1.1.1 (2017-06)

2014/53/EU

EMV – Richtlinie
EMC – Directive
ETSI EN 301 489-1 V1.9.2 (2011-09)
DIN EN 61000-6-2:2005
DIN EN 61000-6-3:2007 + A1:2011

2014/30/EU

Niederspannungsrichtlinie
Low-voltage Directive

2014/35/EU

RoHS – Richtlinie
RoHS – Directive
DIN EN 50581:2012

2011/65/EU

Bad Pyrmont, den 2019-03-15

Stephan Meinberg
Production Manager