TECHNICAL REFERENCE

LANTIME M400

GPS/LNE

5th April 2018

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

1 Imprint ........................................ 1

2 Safety Instructions for Building-in Equipment 2
   2.1 Used Symbols ................................... 3

3 Global Information LANTIME M400/GPS .......... 4

4 Technical Specifications LANTIME Chassis ...... 5

5 LANTIME M400 - Front connectors .............. 6

6 M400 - Rear connectors ........................ 8
   6.1 Power connect .................................. 8
   6.2 RS232 COMx Timestring ....................... 9
   6.3 GPS Status LEDs ................................ 9
   6.4 10/100base-T Ethernet (IEEE 803.2) ........ 9
   6.5 Terminal ....................................... 10
   6.6 USB Port ....................................... 10
   6.7 GPS Antenna .................................... 10
   6.8 Pulse Per Second Output ...................... 11
   6.9 10MHz Output .................................. 11
   6.10 Error Relay .................................... 12

7 Mounting the GPS Antenna ......................... 13
   7.1 Example: ....................................... 13
   7.2 Antenna Assembly with Surge Voltage Protection ................................ 14
   7.3 Antenna Short-Circuit ........................ 15

8 WEEE Compliance ................................ 16

9 Declaration of Conformity ........................ 17
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: 2016-10-14
# 2 Safety Instructions for Building-in Equipment

This building-in equipment has been designed and tested in accordance with the requirements of Standard IEC60950-1 "Safety of Information Technology Equipment, including Electrical Business Equipment".

During installation of the building-in equipment in an end application (i.e. rack) additional requirements in accordance with Standard IEC60950-1 have to be taken into account.

- The building-in equipment is a class 1 - equipment and must be connected to an earthed outlet (TN Power System).
- The building-in equipment has been evaluated for use in office environment (pollution degree 2) and may be only used in this environment. For use in rooms with a higher pollution degree more stringent requirements are applicable.
- The building-in equipment may not be opened.
- Protection against fire must be assured in the end application.
- The ventilation opening may not be covered.
- The equipment/building-in equipment was evaluated for use in a maximum ambient temperature of 50°C (40 °C by using Rubidium).
- For safe operation the building-in equipment must be protected by max 16 A fuse in the power installation system.
- Disconnection of the equipment from mains is done by pulling the mains plug.
### 2.1 Used Symbols

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Symbol</th>
<th>Beschreibung / Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><img src="image" alt="IEC 60417-5031" /></td>
<td>IEC 60417-5031 Gleichstrom / Direct current</td>
</tr>
<tr>
<td>2</td>
<td><img src="image" alt="IEC 60417-5032" /></td>
<td>IEC 60417-5032 Wechselstrom / Alternating current</td>
</tr>
<tr>
<td>3</td>
<td><img src="image" alt="IEC 60417-5017" /></td>
<td>IEC 60417-5017 Erdungsanschluss / Earth (ground) Terminal</td>
</tr>
<tr>
<td>4</td>
<td><img src="image" alt="IEC 60417-5019" /></td>
<td>IEC 60417-5019 Schutzleiterklemme / Protective Conductor Terminal</td>
</tr>
<tr>
<td>5</td>
<td><img src="image" alt="ISO 7000-0434" /></td>
<td>Vorsicht, Risiko eines elektrischen Schlages / Caution, possibility of electric shock</td>
</tr>
<tr>
<td>6</td>
<td><img src="image" alt="ISO 7000-0434" /></td>
<td>ISO 7000-0434 Vorsicht, Risiko einer Gefahr / Caution, Danger</td>
</tr>
<tr>
<td>7</td>
<td><img src="image" alt="2012/19/EU" /></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>

**CE label**

This device follows the provisions of the directives 93/68/EEC.
3 Global Information LANTIME M400/GPS

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 GPS 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
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 “GPS: NORMAL OPERATION” the messages, “GPS: COLD BOOT”, “GPS: WARM BOOT” or “GPS: UPDATE ALMANAC” can appear (as GPS reference Time). In case the antenna connection is interrupted, the following message is shown: “GPS: ANTENNA FAULTY”.
2. By using the 4 arrows and the buttons "ESC", "F1", and "F2" of the keypad, you can navigate through each menu on 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 GPS)
   - red: the reference clock does not provide a valid time

"Time Service"
- green: NTP is synchronized to the reference clock, e.g. GPS
- 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
6 M400 - Rear connectors

6.1 Power connect

Input Voltage Range: 100–240 V AC, 50 – 60Hz

Input Current: 0,5 A max

Input Fuse: 250 V / 1,6 A SlowBlow

Connector: 5pin. DFK

Pin Assignment:
1: VCC -
2: not connected
3: GND (Ground)
4: not connected
5: VCC +
6.2 RS232 COMx Timestring

**Connector:** D-SUB 9pin female connector

**Cable:** shielded data line

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

6.3 GPS Status LEDs

**LED Indicators**
- **Fail:** red: time has not synchronized
- **Ant. Fail:** red: antenna faulty or not connected
- **Nav. Solved:** green: positioning successfully
- **Init:** blue: while the receiver passes through the initialization phase  
  green: the oscillator has warmed up

6.4 10/100base-T Ethernet (IEEE 803.2)

**Link Speed:** 10/100 MBit

**Connector Type:** 8P8C (RJ45)

**Cable:** CAT 5.0

**Duplex Modes:** Half/Full/Autonegotiation
6.5 Terminal

To connect a serial terminal (according to the device model), use the RJ45 connector of the LAN-CPU. Via the serial terminal connection it is possible to configure parameters with a command line interface. You have to use a CAB-CONSOLE-RJ45 cable to establish a connection to your PC or Laptop computer. You can use e.g. the standard Hyperterminal program shipped with your Windows operating system. Configure your terminal program with 38400 Baud, 8 Databits, no parity and 1 Stopbit. The terminal emulation have to set to VT100. After connecting to the timeserver there will be displayed the login message (press RETURN for first connection:

(default user: root; password: timeserver).

6.6 USB Port

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

6.7 GPS Antenna

Cable: shielded coax

Cable Length: max. 300m to RG58, max. 700m to RG213

Connector: BNC female or N-type female

Input GPS: Antenna circuit 1000 V DC insulated

Local Oscillator to Converter Frequency: 10 MHz

First IF Frequency: 35.4 MHz

1) these frequencies are transferred via the antenna cable.

Power Requirements: 12V ... 18V, 100mA (via antenna cable)
6.8 Pulse Per Second Output

Level: TTL 2.5 V into 50 Ohm
Connector: BNC, female
Cable: shielded coax line
Pulse length: 200 ms

6.9 10MHz Output

Level: TTL 2.5 V into 50 Ohm
Connector: BNC, female
Cable: shielded coax line
6.10 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
7 Mounting the GPS Antenna

The GPS satellites are not stationary, but circle round the globe with 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/downconverter unit must be installed in a location that has as clear a view of the sky as possible. The best reception is achieved when the antenna has a free view of 8° angular elevation above the horizon. If this is not possible, the antenna should be installed with the clearest free view to the equator, because the satellite orbits are located between latitudes 55° North and 55° South. If this is not possible, you may experience difficulty receiving the four satellites necessary to complete the receiver’s position solution.

The antenna/converter unit can be mounted on a wall, or on a pole up to 60 mm in diameter. A 50 cm plastic tube, two wall-mount brackets, and clamps for pole mounting are included. A standard RG58 coaxial cable should be used to connect the antenna/downconverter unit to the receiver. The maximum length of cable between antenna and receiver depends on the attenuation factor of the coaxial cable.

Up to four GPS receivers can be run with one antenna/downconverter unit by using an optional antenna splitter. The total length of an antenna line from antenna to receiver must not be longer than the max. length shown in the table below. The position of the splitter in the antenna line does not matter.

The optional delivered MBG S-PRO protection kit can also be used for outdoor installation (degree of protection: IP55). However, we recommend an indoor installation, as close as possible to the wall where the antenna cable is entering, to minimize the risk of overvoltage damage, for example by lightning.

7.1 Example:

<table>
<thead>
<tr>
<th>Type of cable</th>
<th>diameter Ø</th>
<th>Attenuation at 100MHz</th>
<th>max lengt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RG58/CU</td>
<td>5mm</td>
<td>17</td>
<td>300 m</td>
</tr>
<tr>
<td>RG213</td>
<td>10.5mm</td>
<td>7</td>
<td>700 m</td>
</tr>
</tbody>
</table>

(1) This specifications are made for antenna/converter units produced after January, 2005. The values are typically ones; the exact ones are to find out from the data sheet of the used cable.
7.2 Antenna Assembly with Surge Voltage Protection

Optional a surge voltage protector for coaxial lines is available. The shield has to be connected to earth as short as possible by using the included mounting bracket. Normally you connect the antenna converter directly with the antenna cable to the system.

GPS Antenna
free view to the sky!

Cable Slot
N-Norm female
N-Norm male
N-Norm male
N-Norm female
N-Norm female
N-Norm male

Ground lead to PE rail
(Protective Earth)
Cable ca. 1.5 mm Ø
fastened at the surge protector

Meinberg GPS
N-Norm male female
or BNC male female
7.3 Antenna Short-Circuit

(systems with front display only)
In case of an antenna line short-circuit the following message appears in the display:

ANTENNA SHORT-CIRCUIT DISCONNECT POWER !!!

If this message appears the clock has to be disconnected from the mains and the defect eliminated. After that the clock can be powered-up again. The antenna supply voltage must be 15Vdc.
8 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.
9 Declaration of Conformity

Konformitätserklärung
Doc ID: LANTIME M400/GPS/LNE-2016-10-14

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

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

Produktbezeichnung LANTIME M400/GPS/LNE
Product Designation

auf das sich diese Erklärung bezieht, mit den folgenden Normen übereinstimmt
to which this declaration relates is in conformity with the following standards

EN 55032:2012, Class B Limits and methods of measurement of radio interference characteristics of information technology equipment

EN 55024:2010 Limits and methods of measurement of Immunity characteristics of information technology equipment


EN 50581:2012 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

gemäß den Richtlinien 2014/30/EU (Elektromagnetische Verträglichkeit), 2014/35/EU (Niederspannungsrichtlinie), 2011/65/EU (Beschränkung der Verwendung bestimmter gefährlicher Stoffe) und 93/68/EG (CE Kennzeichnung) sowie deren Ergänzungen.

generating the provisions of the directives 2014/30/EU (electromagnetic compatibility), 2014/35/EU (low voltage directive), 2011/65/EU (restriction of the use of certain hazardous substances) and 93/68/EEC (CE marking) and its amendments.

Bad Pyrmont, 2016-10-14

Günter Meinberg
Managing Director