

LANTIME M450

Product Highlights

- | A powerful Stratum 1 NTP server capable of processing up to 25,000 requests per second
- | Compact DIN/TS35 rail-mounted chassis
- | Engineered to order with a selection of reference receiver module options (GNSS, DCF77, timecode)
- | Available with an AC/DC or a “low DC” (20V – 60V) power supply unit to meet your specific needs



High-Performance Time Server for Time & Frequency Synchronization in a Compact Chassis

The LANTIME M450 is designed by Meinberg to offer superior NTP server performance in an industrial environment with a robust rail-mounted chassis. Constructed to order with a selection of signal receivers to enable you to synchronize your server to the remote timing signal that you trust most, the LANTIME M450 servers can be built to support timing signals from any of the main satellite navigation systems in operation (GPS, Galileo, BeiDou, GLONASS), from a long-wave timing signal radio service (DCF77), or from an external timecode generator.

Meinberg's custom Linux-based LANTIME Operating System (LTOS), a slim & secure OS developed specially for the needs of a time server, powers the LANTIME M450 under the hood, providing access to all the security, network, and monitoring features that you could ever need from an enterprise-grade synchronization appliance.

The powerful Web UI enables you to quickly and easily configure and monitor your LANTIME device, while the CLI provides power users with unparalleled flexibility and efficiency. The comprehensive LTOS REST API provides a complete toolset for your network orchestration and automation needs, and SNMP support allows you to integrate your Meinberg systems into your existing network management system.

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Basic System Specifications

Processor	Intel Atom E3805 dual-core SoM (1.33 GHz, 1 MB L2 cache, 3 W TDP)
Operating System	Custom LANTIME Operating System Firmware (LTOS) based on Linux 4.x LTS kernel
Main Memory	2 GB DDR3L onboard
Flash Disk	4 GB eMMC Flash

Monitoring & Alarms

Supported Protocols	SNMP v1, SNMP v2, SNMP v3
Notification Channels	Email (SMTP), syslog
Log Access	Logs can be viewed and downloaded in the Web Interface, downloaded via the FTP service, or accessed via the command line interface

NTP Support

NTP Protocols	NTP v2 (RFC 1119), NTP v3 (RFC 1305), NTP v4 (RFC 5905), SNTP v3 (RFC 1769), SNTP v4 (RFC 2030)
Security Features	Symmetric key-based authentication using MD5, SHA-1, or AES-128-CMAC hashes NTP v4 Autokey (private/public key pairs) NTS encryption (RFC 8915) for NTP v4 in unicast client mode
Performance	Up to 25,000 NTP requests per second

Management Interfaces

Network	Web Interface (HTTP/HTTPS TLS v1.3) SSH v2 (command line interface) Telnet (command line interface) REST API (HTTP/HTTPS TLS v1.3)
Serial Console	8P8C ("RJ45-like") connector for serial terminal access
Local	Front display & function keys

Operating Specifications

Acoustic Noise Emissions	0 dB(A)
Operating Temperature	0 °C to 50 °C (32 °F to 122 °F)
Storage Temperature	-20 °C to 70 °C (-4 °F to 158 °F)
Relative Humidity	Max. 95 % at 40 °C (104 °F), non- condensing
Operating Altitude	Max 2,000 m / 6,562 ft (above sea level)

Electrical Specifications

Power Draw (Typical)	20 W
Power Consumption (Maximum)	30 W

Accessories Included

- Two-part power cable (5-pin MSTB to IEC 60320 C14 cable, IEC 60320 C13 cable to local mains plug) or 5-pin MSTB connector for assembly of a suitable power cable for DC power sources.
- Printed setup guide explaining the basic setup process and antenna installation.
- Models with a GPS or GNS-UC clock receiver include a Meinberg GPSANTv2 antenna for outdoor installation, a mounting kit containing all the accessories required to mount the antenna on a pole or wall, and a 20 m (65.6 ft) RG58 coaxial cable with pre-fitted connectors as standard*.
- Models with a GNS or GNM clock receiver include a Meinberg GNMANTv2 antenna for outdoor installation, a mounting kit containing all the accessories required to mount the antenna on a pole or wall, and a 20 m (65.6 ft) Speedfoam 240HFJ coaxial cable with pre-fitted connectors as standard*.
- Models with a PZF clock receiver include a Meinberg AW02 long-wave antenna, a mounting kit for outdoor installation, and a 10 m (32.8 ft) RG58 coaxial cable with pre-fitted connectors as standard*.

* Meinberg also offers customized antenna cables to accommodate your specific installation requirements. Please reach out to your Meinberg Sales Representative for more information.

“TCXO” Type Oscillator

The LANTIME M450 is shipped as standard with a “TCXO” (temperature-controlled crystal oscillator), which provides excellent holdover performance if your server loses synchronization with its upstream reference for any reason:

PPS Accuracy	< ±100 ns
Short-Term Frequency Stability at 10 MHz	$\pm 2 \times 10^{-9}$ Hz where t = 1 second
10 MHz Frequency Accuracy (GNSS-Synchronized, 24 Hours)	$\pm 1 \times 10^{-11}$ Hz (± 0.1 mHz)
10 MHz Frequency Accuracy (after 24 Hours in Holdover)	$\pm 1 \times 10^{-7}$ Hz (± 1 Hz)
10 MHz Frequency Accuracy (after 1 Year in Holdover)	$\pm 1 \times 10^{-6}$ Hz (± 10 Hz)
Phase Drift (after 24 Hours in Holdover)*	± 4.3 ms
Phase Drift (after 7 Days in Holdover)*	± 128 ms
Phase Drift (after 30 Days in Holdover)*	± 1.1 s
Phase Drift (after 1 Year in Holdover)	± 16 s
Phase Noise	- 1 Hz: < -60 dBc/Hz - 10 Hz: < -90 dBc/Hz - 100 Hz: < -120 dBc/Hz - 1 kHz: < -130 dBc/Hz
Temperature-Dependent Drift	$\pm 1 \times 10^{-6}$ (-20 °C to 70 °C, -4 °F to 158 °F)

* Full holdover performance requires the system to have been synchronized for 24 hours previously.

Oscillator Options

The LANTIME M450 may also be shipped on request with a more powerful holdover solution; the options available and a comparison of their performance relative to the TCXO oscillator are listed below:

Type	Phase Drift after 24 Hours in Holdover*	Phase Drift after 1 Year in Holdover*
TCXO	± 4.3 ms	± 16 s
OCXO SQ	± 65 µs	± 4.7 s
OCXO HQ	± 10 µs	± 788 ms
OCXO DHQ	± 4.5 µs	± 158 ms

* Full holdover performance requires the system to have been synchronized for 24 hours previously.

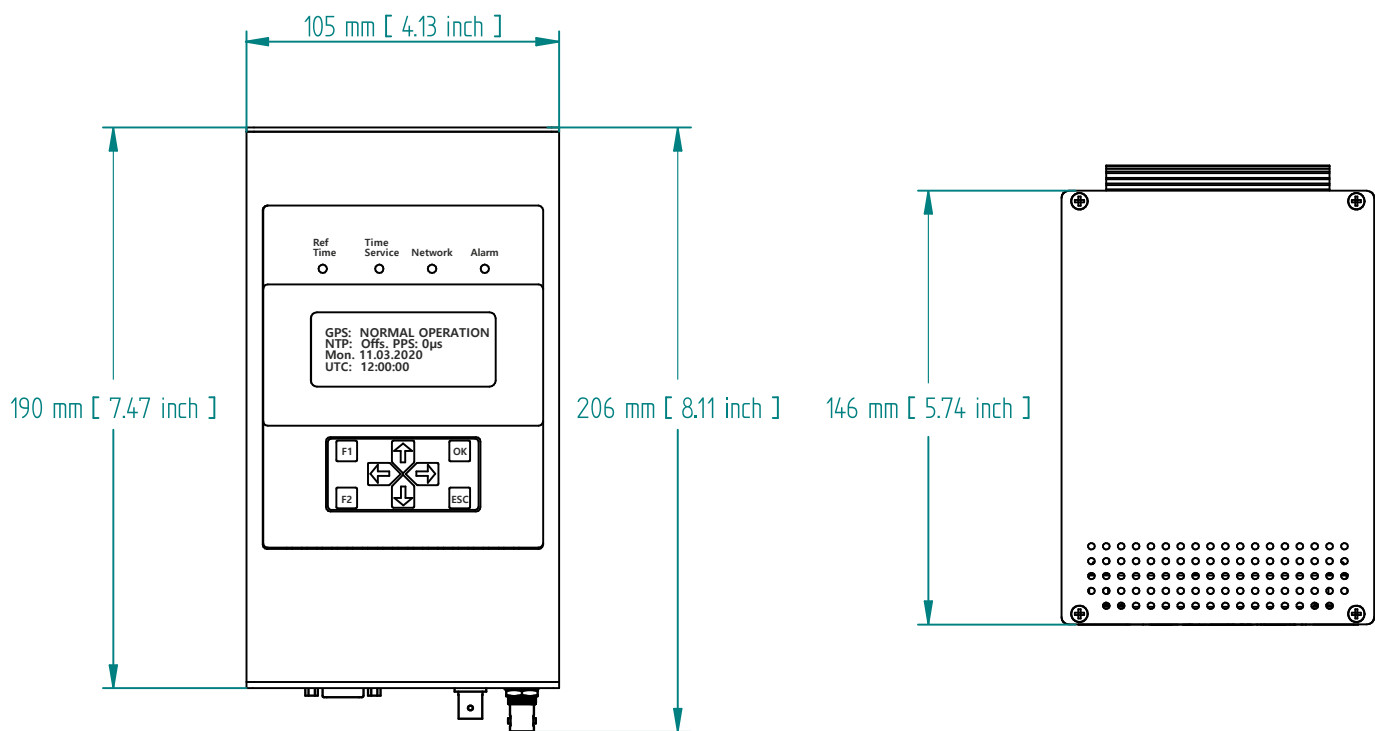
Support & Compliance

Technical Support	Free lifetime support via telephone and email, including firmware updates
Warranty	Three-year warranty, extendable upon request
Firmware Updates	Firmware is field-upgradable; updates can be installed from a connected USB storage medium, via the Web Interface (upload via a web browser), or via the CLI (download from a server). The LANTIME Operating System Firmware LTOS allows you to install multiple firmware versions onto the device concurrently and select which one should be used when the system starts.
Conformity Declarations	CE, UKCA
RoHS Compliance	The product is fully RoHS-compliant.
WEEE Status	The purchase of this product is considered to be a “B2B” transaction (non-household product) for the purposes of the EU Waste of Electrical and Electronic Equipment Directive; the product falls under Category 6, “Small IT and Telecommunications Equipment”. For disposal, it can be returned to the manufacturer to ensure WEEE compliance. Any transportation expenses for returning this product (at end-of-life) must be covered by the end user, while Meinberg will cover the costs for the waste disposal itself.

Available Receiver Types

	Description	Recommended Cable	Input Specifications
GPS*	12-channel L1 C/A code receiver for reception of signals from the GPS satellite constellation. Requires a Meinberg GPSANTv2 antenna (included with system as standard).	RG58 (max. length 300 m) RG213 (max. length 700 m) H2010 Ultraflex (max. length 1100 m)	Connector Type: BNC or Type-N Termination Impedance: 50 Ω Power Output: 15 V, 100 mA (for powering antenna) Input Signal: 35.4 MHz intermediate frequency
GNS-UC*	72-channel receiver for reception of signals from the GPS (L1 C/A code) and Galileo (E1 B/C) satellite constellations. Requires a Meinberg GPSANTv2 antenna (included with system as standard).	RG58 (max. length 300 m) RG213 (max. length 700 m) H2010 Ultraflex (max. length 1100 m)	Connector Type: BNC or Type-N Termination Impedance: 50 Ω Power Output: 15 V, 100 mA (for powering antenna) Input Signal: 35.4 MHz intermediate frequency
GNS	72-channel receiver for reception of signals from the GPS (L1), Galileo (E1 B/C), BeiDou (B1I), and GLONASS (L1OF) satellite constellations. Meinberg GNMANTv2 antenna recommended (included with system as standard).	Speedfoam 240HFJ (max. length per segment 70 m, antenna line extendable with Meinberg INA-20 and INA-30 inline amplifiers)	Connector Type: SMA Termination Impedance: 50 Ω Power Output: 5 V, 120 mA (for powering antenna) Input Signal: Native GNSS signal
GNM	184-channel multi-band, multi-GNSS receiver for reception of signals from the GPS (L1 C/A and L2 bands), Galileo (E1-B/C and E5b bands), BeiDou (B1I and B2I bands), and GLONASS (L1OF and L2OF bands) constellations. Requires a Meinberg GNMANTv2 antenna (included with system as standard).	Speedfoam 240HFJ (max. length per segment 70 m, antenna line extendable with Meinberg INA-20 and INA-30 inline amplifiers)	Connector Type: SMA Termination Impedance: 50 Ω Power Output: 5 V, 120 mA (for powering antenna) Input Signal: Native GNSS signal
TCR	Timecode receiver for reception of DC level shift (pulse-width modulated) or AM (amplitude-modulated) timecode signals in a wide variety of standardized formats.	RG58 (max. length dependent on operating conditions such as termination impedance and signal voltage)	Connector Type: BNC Typical Input Voltage (DC Level Shift): 5 V DC Input Voltage Range (AM): 800 mV _{pp} – 8 V _{pp}
PZF	Long-wave receiver with quadrature demodulator for reception of signals from the DCF77 long-wave transmitter in Mainflingen, Germany. Requires a Meinberg AW02 or AI01 antenna.	RG58 (max. length 300 m)	Reception frequency: 77.5 kHz Termination Impedance: 50 Ω Power Output: 5 V (for powering antenna) Input Signal: 77.5 kHz signal with DCF77 encoding

LANTIME M450 Chassis



Chassis Specifications

Form Factor	Compact rail-mounted chassis
Dimensions (Only Chassis) [W x H x D]	105 mm x 190 mm x 146 mm (4.14 in x 7.48 in x 5.75 in)
Dimensions (including Connectors & Handles) [W x H x D]	105 mm x 206 mm x 146 mm (4.14 in x 8.11 in x 5.75 in)
Material	Aluminum (extruded section)
IP Rating	IP30

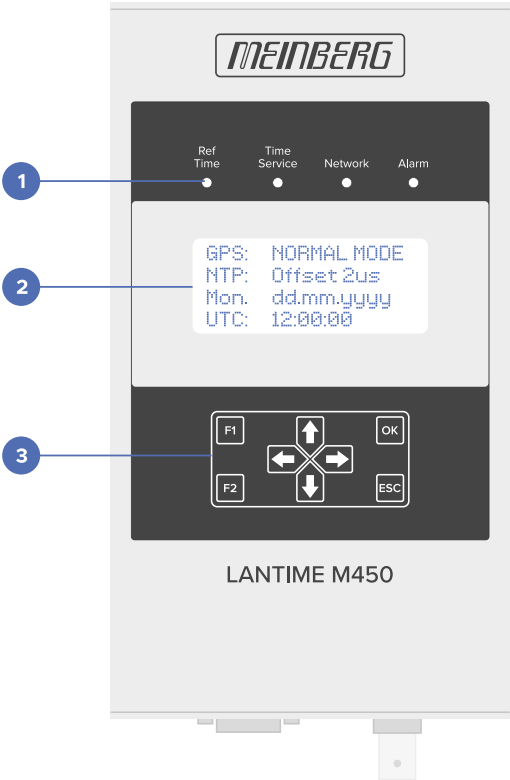
LANTIME M450 Display View

Actual display may vary depending on installed clock-receiver.

1 Status LEDs

The status readouts provided by these LEDs are also provided by the corresponding LEDs on the connector side of the device.

Ref. Time (R)	Indicates whether the reference clock is providing a valid timebase.
Time Service (T)	If lit, the internal NTP service of the server is synchronized with the reference clock.
Network (N)	Shows whether there is a valid link-up on the network interface.
Alarm (A)	Advises of a general system fault that requires attention.



2 LCD Panel

- | 4 x 16 character backlit display for clarity even in low-light conditions.
- | Status display (as shown above) indicates the status of the clock receiver, the current date and time of the clock, and the current offset of the NTP server.
- | Provides status readouts and allows basic configuration processes to be performed using the front-panel function keys.
- | Shows alarms and alerts requiring user intervention.

3 Function Keys

“F1”, “F2”, “OK”, “ESC”, and arrow keys allow for local navigation of configuration menus and status readouts to enable many configuration processes to be performed directly from the device during installation.

LANTIME M450 Connector View

This illustration represents an example configuration (**LANTIME M450/GPS/TC-1-1**) that indicates the general location of specific connectors on a given LANTIME M450. The exact location of specific connectors may vary depending on the specific configuration ordered. Should you require a data sheet for a specific LANTIME M450 configuration, please reach out to your Meinberg Sales Representative.

1 System Status LEDs

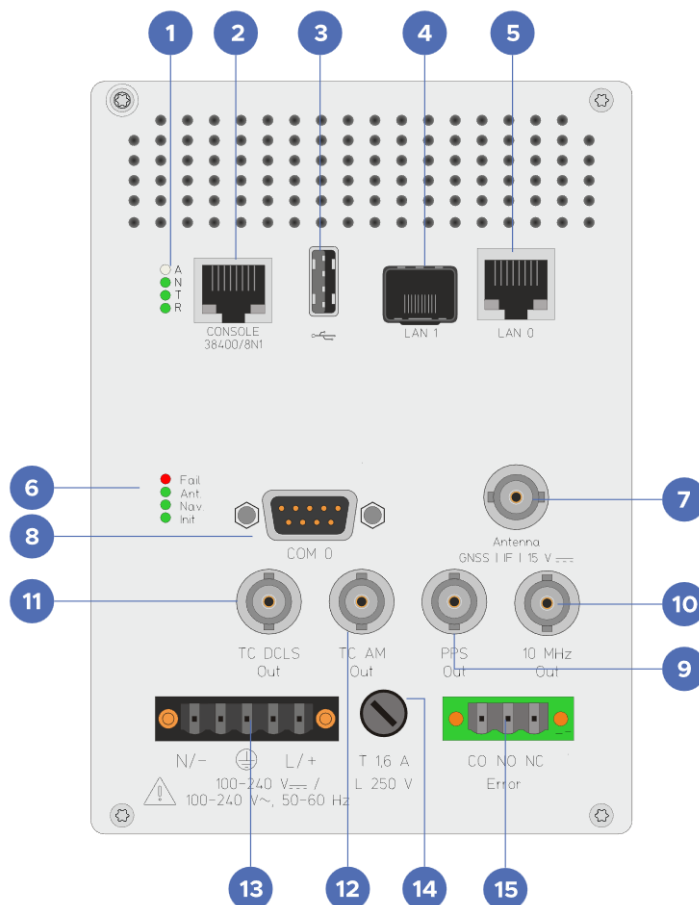
The status readouts provided by these LEDs are also provided by the corresponding LEDs on the display side of the device.

“A” LED	“Alarm” LED for indicating general system faults.
“N” LED	“Network” LED for indicating proper function or fault of network connections (“link-up state”).
“T” LED	“Time Service” LED for indicating synchronization status of NTP with reference clock.
“R” LED	“Reference Clock” LED for indicating proper function or fault state of reference clock.

2 Serial Console Port (Terminal Access)

The serial console port is a standard RS-232 interface with an 8P8C (“RJ45-like”) female connector that can be used to establish a direct serial connection (38400 baud, 8N1 framing) between the LANTIME M450 and any device running suitable terminal software (e.g., a laptop) for direct command line access.

The connection can be established using any suitable RS-232 cable or adapter (e.g., RJ45 to D-Sub 9, Yost wiring standard).



3 USB Interface

This USB interface can be used for:

- | saving a backup of the LTOS configuration to an external storage medium (such as a USB flash drive) and restoring this backup (or copying a standard configuration between multiple LANTIME servers)
- | creating a backup of logfiles (such as SyncMon logs)
- | loading and saving cryptographic certificates
- | creating a physical USB “security key” that can be used to enable and disable the local function keys on the device

4 Network Interface (SFP)

The SFP port supports a number of SFP modules to allow connection of copper and fiber-optic network cables, allowing you to balance performance and flexibility as you need it. Refer to point 5 below for further information on network connectivity.

The following SFP modules have been tested by Meinberg and are certified for optimum functionality with the LANTIME M450:

Single-Mode Optical Fiber	Avago AFCT-5710PZ Finisar FTLF1318P3BTL
Multi-Mode Optical Fiber	Avago AFBR-5710PZ Finisar FTLF8524P3BNL
RJ45 Copper	Avago ABCU-5740RZ Finisar FCLF8521P2BTL

5 Network Interface (RJ45)

Network Interfaces	1x RJ45 10/100/1000-BASE-T interface (Gigabit Ethernet) with link status LEDs Additional Ethernet Interface configurations available as an option
Network Protocols	IPv4 (with DHCP support), IPv6 (with DHCPv6 and Autoconf support)
Network Services	HTTP(S) for web interface and REST API access FTP for access to log files and uploading firmware updates Telnet and SSH for command line access SNMP for monitoring
Other Networking Features	Full Parallel Redundancy Protocol (PRP) support as Doubly Attached Node Support for network link aggregation ("bonding") with multiple modes for load balancing or link redundancy

6 Receiver Clock Status LEDs

The specific LEDs will depend on whether the LANTIME M450 is equipped with a GNSS satellite receiver, a PZF long-wave receiver, or a time code receiver. The illustration above represents a LANTIME M450 fitted with a GPS receiver and may vary in other models.

GNSS Satellite Receiver (Type GPS, GNS, GNS-UC)	
"Fail" LED	When lit, this reveals if that clock is having problems with synchronization.
"Ant." LED	Indicates that there is no functional connection to the antenna or that there is a short-circuit in the connection with the antenna.
"Nav." LED	Shows the state of the geolocation process.
"Init." LED	Provides an indication of initialization state of the clock and onboard oscillator.

DCF77 Long-Wave Receiver (Type PZF)	
"Init" LED	Specifies the initialization state of the clock and onboard oscillator.
"Field" LED	Indicates the detection of adequate DCF reception.
"Ant Fail" LED	Reveals problems with the antenna connection.
"Fail" LED	When lit, this indicates problems with clock synchronization.

Time Code Receiver (Type TCR)	
"Fail" LED	Used to report problems with clock synchronization.
"Tele" LED	Provides confirmation of the integrity of time code input.
"Data" LED	Shows that IRIG data has been successfully extracted from incoming time code data.
"Init." LED	Specifies the initialization state of the clock and onboard oscillator.

7 GPS Antenna Input

The specifications of the antenna and its connector are dependent on the selected clock receiver. This example features a GPS receiver.

Antenna	GPSANTv2*
Connector Type	Bayonet Neill-Concelman (BNC) connector for coaxial cable
Input Impedance	50 Ω
Input Signal	35.4 MHz intermediate frequency
Power Supply	15 V, 100 mA to antenna via antenna cable
Supported Cable Length	Max. 300 m (RG 58) Max. 700 m (RG 213) Max. 1100 m (H2010 Ultraflex)

* For more detailed information on the GPSANTv2 antenna, request a copy of the Meinberg GPSANTv2 data sheet from your Meinberg Sales Representative, or download it directly from the Meinberg website:

<http://mbg.link/gpsant>

8 Time String Output (RS-232)

Connector Type	D-Sub 9-pin
Data Transmission Method	Serial
Baud Rate	19200 (Default), 9600, 4800, 2400, 1200, 600, 300
Framing	7N2, 7E1, 7E2, 8N1 (Default), 8N2, 8E1, 7O1, 7O2, 8O1, 8E2
Output String Support	Meinberg Standard (Default), Meinberg Capture, Meinberg GPS, SAT, NMEA RMC, NMEA GGA, NMEA ZDA, NMEA RMC GGA (RMC followed by GGA), NMEA GGA ZDA (GGA followed by ZDA), Uni Erlangen, Computime, Sysplex 1, SPA, RACAL, ION, ION Blanked, IRIG-J-1, 6021, Freelance
Pinout	Pin 2: TxD Pin 3: RxD Pin 5: GND

9 Pulse-per-Second Output

Connector Type	BNC, female (for shielded coaxial cable)
Output Signal	Pulse-per-second (PPS)
Signal Level	TTL pulse, active high, 2.5 V _p with 50 Ω load
Pulse Width	200 ms

10 10 MHz Output

Connector Type	BNC, female, for shielded coaxial cable
Output Signal	10 MHz frequency
Signal Level	TTL pulse, 2.5 V _p with 50 Ω load

11 DCLS Timecode Output

Connector Type	BNC, female (for shielded coaxial cable)
Output Signal	DC level shift timecode, pulse-width modulated
Signal Level	TTL pulse, active high, 2.5 V _p with 50 Ω load
Supported Time Code Formats	IRIG-B (B002, B003, B006, B007), AFNOR NF S87-500, IEEE1344, C37.118

12 AM Timecode Output

Connector Type	BNC, female (for shielded coaxial cable)
Output Signal	Sine wave signal, unbalanced, amplitude modulated
Signal Level	3 V _{pp} / 1 V _{pp} (MARK/SPACE) with 50 Ω load
Carrier Frequency	1 kHz
Supported Time Code Formats	IRIG-B (B122, B123, B126, B127), AFNOR NF S87-500, IEEE 1344, C37.118

13 Power Supply

Connector Type	5-pin MSTB female connector
	Power supply cable provided for AC mains power supply
	5-pin MSTB male connector supplied for assembly of cable for DC power supply
Voltage Range	AC/DC power supply unit: 100–240 V AC (50–60 Hz), 100–240 V DC
	“Low DC” power supply unit: 20–60 V DC (rated), 48 V DC (nominal)
Power Consumption	20 W (typical), 30 W (max.)

14 Replaceable Fuse

Fuse Standard	IEC 60127 (5 x 20 mm)
Rated Voltage	250 V
Rated Current	1.6 A
Fuse Type	Slow-blow

15 Error Relay

Connector Type	3-pin MSTB
Max. Switching Voltage	125 V DC
	140 V AC
Max. Switching Current	1 A
Max. Switching Power	30 W DC
	60 VA AC
UL/CSA Switching Power	0.46 A / 140 V AC
	0.46 A / 65 V DC
	1 A / 30 V DC
Response Time	Approx. 2 ms
Relay States	Normal Operation: CO & NO connected
	Error State: CO & NC connected

Revision History

Note: This changelog encompasses all data sheets pertaining to the general product series to which the LANTIME M450 belongs and may contain information not relating to the specific model described by this data sheet.

Version (Date)	Changes
2023-03-01	Initial version
2023-03-22	Information on fiber-optic PPS and time string outputs (applicable models only)
2023-03-07	Modified “Management Interfaces” section Removed OCXO-MQ oscillator Added power consumption
2024-04-16	Dedicated cover sheet, moved information onto page 2 onwards
2024-05-13	Updated contact block on cover page to include Meinberg USA More detailed specifications for power supply modules
2024-08-22	Removed OCXO-LQ oscillator
2024-09-10	Added link to further information about GPSANTv2 for GPS type reference clocks
2024-11-08	Expanded error relay section Expanded time string section Modified performance specifications of OCXO-HQ oscillator
2025-02-24	Changed references to “IF antenna” into “GPSANTv2 antenna” (GPS/GNS-UC models) Removed references to type N antenna connectors (GPS/GNS-UC models) Added additional dimensions reflecting connectors
2025-01-24	Expanded AD10 power module specifications
2025-03-11	Layout adjustments
2025-10-10	Replaced references to legacy antenna and Belden H155 cable with GNMANTv2 (GNS models) Updated info on use of DC power supply (DC models) Tables now stylistically consistent Added GPSANTv2 intermediate frequency (GPS/GNS-UC models) More detailed specifications for oscillators Overhauled GPS antenna input specifications
2025-11-27	Added dedicated M450 chassis chapter with drawing Added revision history Minor adjustments to intro text Fixed incorrect labelling of connector view Fixed incorrect fuse rating Expanded receiver information Split electrical specifications and operating specifications Removed reference to desktop use