



The Synchronization Experts.



SETUP GUIDE

IMS-LNO

Hot-Plug Module

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Meinberg Funkuhren GmbH & Co. KG

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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

Website: <https://www.meinbergglobal.com>

Email: info@meinberg.de

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Manual
Version:

2 Introduction

This Setup Guide is a systematically structured guideline which supports you during the set-up of your Meinberg product.

The IMS-LNO is a 10 MHz generator card and provides sinewave signals with low phase noise at four outputs. It has a microprocessor system which monitors the output signals and generates status signals for the management system.

Functionality

A high-quality oscillator is synchronized by the 10 MHz signal of the external reference clock and thus provides the high-precision clock for the IMS-LNO. The microprocessor monitors the lock state of the PLL synchronization circuit and the warm-up phase of the oscillator and only enables the outputs after a successful phase synchronisation. This state is also indicated by the four status LEDs (transition from red to green). In the phase synchronous state, the output level of the four outputs is monitored and in case of an error is signaled by the assigned red LED.

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

Download link: <http://www.mbg.link/doce-fw-ltos>

Compatibility

The IMS-LNO is an IMS module which is compatible with all systems of the IMS family. It can also be used on any slot (MRI, ESI, I/O).

3 Important Safety Information



Please ensure that IMS modules designed for "hot-plugging" (modules that are removable and insertable while a system is in operation) are always handled with the utmost care.

Before performing any maintenance work on the system:

- We recommend making a backup of any stored configurations (e.g. using a USB flash drive or from the Web UI)
- Take note of the chapter "Prevention of ESD Damage".
- Take note of the chapter "Power Supply".

3.1 Product Documentation

Detailed product documentation is provided on a USB flash drive delivered with the Meinberg system. The manuals can also be downloaded from the Meinberg website at <https://www.meinbergglobal.com>, where you can enter your system name into the search box at the top of the page to find the relevant manual. Alternatively, contact Meinberg Support for further assistance.

The "Docs & Support" menu on the Web Interface also provides user manuals for time server administrators.



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

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

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

Please keep this manual in a safe place.

Target Readership

This manual is only intended to be used by qualified electricians, or by persons who have been appropriately instructed by a qualified electrician and who are familiar with applicable national standards and with safety rules & regulations. This device may only be installed, set up, and operated by qualified personnel.

3.2 Prevention of ESD Damage



ATTENTION!

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



Symbol Indicating Devices with ESDS Components

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

When preparing to dismantle or install devices:

Ground your body (for example, by touching a grounded object) before touching sensitive devices.

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

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

When transporting devices:

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

When dismantling or installing devices:

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

When storing devices:

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

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

3.3 Power Supply



WARNING!

The IMS system in which the module is used is operated at a dangerous voltage. Please refer to your IMS Manual for more information about safety.

When removing a hot-pluggable power supply unit, always disconnect its power cable before removing it from the IMS system.

Never open a power supply unit—there may still be hazardous residual voltages present even after disconnection from the mains supply. In the event that a power supply unit is no longer working (e.g. defective), please return it to Meinberg for repair.

Failure to observe these safety instructions may result in serious injury and/or property damage. The IMS system must only be installed, set up, and operated by qualified personnel.

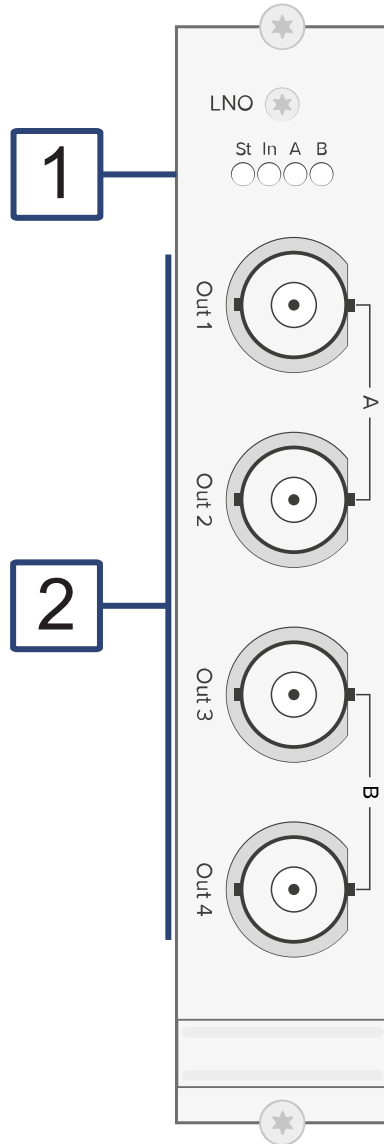
3.4 Cabling



WARNING!

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

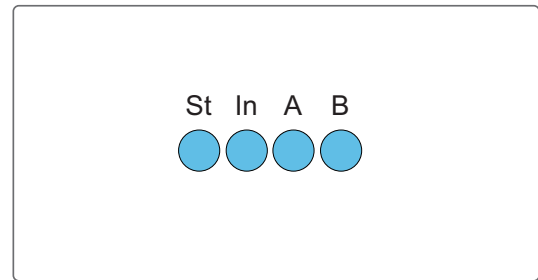
4 Front Connectors IMS-LNO



4.1 IMS-LNO - Status LEDs

Status display

LED St:	Status of the IMS-LNO
LED In:	Status of the backplane output signals
LED A:	Status of the LNO output signals (A)
LED B:	Status of the LNO output signals (B)



The status messages of the LED's are as follows:

LED St:

Blue	During initialization
Green	During operation

LED In.

Green	10 MHz reference available, PLL is locked
Yellow	10 MHz reference available, PLL is not yet locked
Red	10 MHz reference not recognized or insufficient signal quality

LED A - Status output 1-2

1 sec red -> 1 sec yellow -> 1 sec green -> 1 sec off

Green	10 MHz signal available at both outputs
Red	No 10 MHz signal or short circuit at one of the two outputs

LED B - Status output 3-4

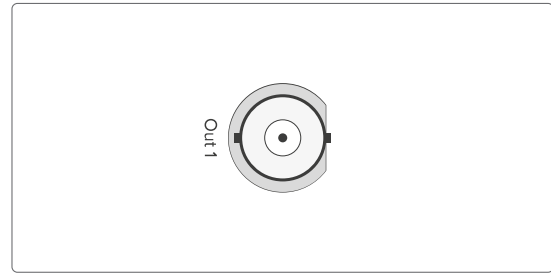
1 sec Red -> 1 sec Yellow -> 1 sec Green -> 1 sec Off

Green	10 MHz signal available at both outputs
Red	No 10 MHz signal or short circuit at one of the two outputs

The output cannot be active before the PLL is locked.

4.2 10 MHz sine Output

Output signal:	10 MHz sine frequency
Signal level:	5 dBm +/- 1 dBm at 50 Ω
Optional Signal level:	8 dBm +/- 1 dBm at 50 Ω 12 dBm +/- 1 dBm at 50 Ω
Port to port isolation:	45 dB
Harmonic harmonics: <	-60 dBc
Non-harmonic harmonics:	< -65 dBc



Phase noise:

OCXO-SQ	< 1 Hz	-80 dBc/Hz
	< 10 Hz	-100 dBc/Hz
	< 100 Hz	-130 dBc/Hz
	< 1 kHz	-140 dBc/Hz
	< 10 kHz	-150 dBc/Hz
OCXO-MQ*	< 1 Hz	-85 dBc/Hz
	< 10 Hz	-110 dBc/Hz
	< 100 Hz	-135 dBc/Hz
	< 1 kHz	-143 dBc/Hz
	< 10 kHz	-155 dBc/Hz

* As of Jan. 2024, OCXO-MQ oscillators are no longer available for LNO modules.

OCXO-HQ	< 1 Hz	-93 dBc/Hz
	< 10 Hz	-126 dBc/Hz
	< 100 Hz	-140 dBc/Hz
	< 1 kHz	-145 dBc/Hz
	< 10 kHz	-165 dBc/Hz

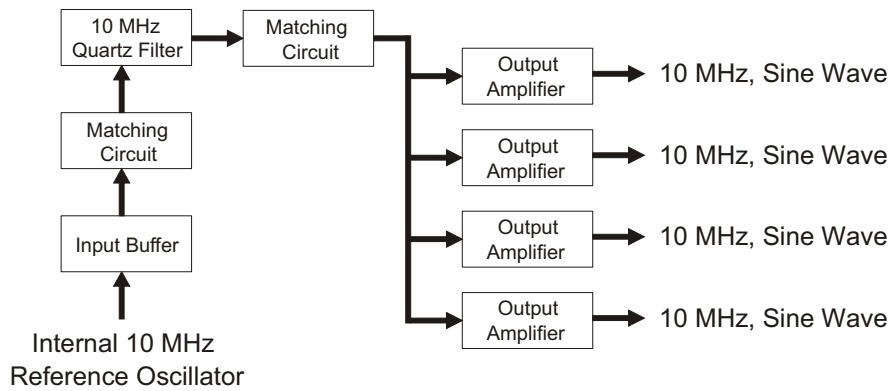
Power supply:	5 dBm	+5 V @ 550 mA (steady state), +5 V @ 670 mA (warm up)
	8 dBm	+5 V @ 720 mA (steady state), +5 V @ 640 mA (warm up)
	12 dBm:	+5 V @ 970 mA (steady state), +5 V @ 620 mA (warm up)

Connection type: BNC socket

Cable: coaxial, shielded

Method

The internal 10 MHz reference signal is fed into a narrow band quartz filter. The generated signal will be provided to up to four outputs via a distribution amplifier circuit.



5 Before You Start

5.1 Contents of Delivery

Unpack the IMS-LNO and all accessories carefully and check the contents of the delivery against the enclosed packing list to ensure that no parts are missing. If any of the listed items are missing, please contact our Sales Department at sales@meinberg.de.

Check that the product has not been damaged in transit. If the product is damaged or fails to operate upon installation, please contact Meinberg immediately. Only the recipient (the person or company receiving the system) may file claims or complaints against the forwarder for damage caused in transit.

Meinberg recommends that you keep the original packaging materials in case the product needs to be shipped or transported again at a later date.

6 System Installation

6.1 Important Information Regarding Hot-Pluggable IMS Modules

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

The following rules apply for the individual IMS slots:

PWR Slot:	"Hot-Swappable"	If you operate your system with only one power supply unit, a second power supply unit must be installed before removing or replacing it in order to keep your system operational.
I/O, ESI, and MRI Slots:	"Hot-Pluggable"	
CLK1, CLK2 Slots:	"Hot-Pluggable"	When a clock module is replaced or installed, it is important to rescan the reference clocks (" Rescan Refclocks ") in the " System " menu of the Web Interface.
RSC/SPT Slots:	"Hot-Pluggable"	It will not be possible for your IMS system to switch between signal generators while the RSC/SPT is not installed.

CPU Slot:	" <u>Not</u> Hot-Pluggable"	Before the CPU is removed, the IMS system must be powered down. Please note that after powering on and rebooting the LANTIME Operating System, the configuration of some IMS modules may be reset to factory defaults!
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Information:

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

6.2 Installation and Removal of Hot-Pluggable IMS Modules

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

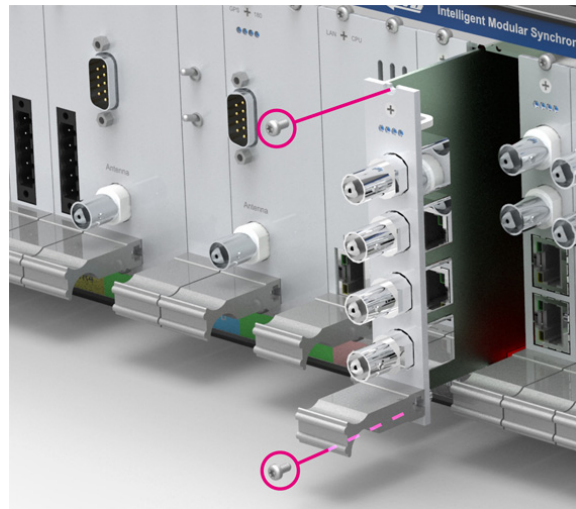


Important!

Heed the safety information in Chapter 3 of this manual!

Removing a Module

1. Remove the two marked Torx screws from the module faceplate.
2. Pull the module **carefully** out of the guide rail. Note that the module will be securely seated in the connector block inside the chassis—a certain amount of force must be applied to release the module. Once the module has been detached from the connector block on the system backplane, the module can be easily pulled out.
3. If the removed module is not to be replaced with another module, a suitable one-slot or two-slot 'placeholder' faceplate should be fitted using the two Torx screws in order to cover this space.



Locations of fixture screws in a 1U IMS system

Installing a Module

1. To replace a module, remove the installed module in accordance with the guide "**Removing a Module**" on the previous page. Otherwise, remove the two Torx screws from the cover plate of the unused slot. We recommend keeping the cover plate in a safe place for later use.
2. Insert the module correctly into the two guide rails of the system chassis. If it cannot be inserted with minimal force, it is possible that the module is not properly seated in the guide rails. In this case, you should pull the module out and try again. **Do not use excessive force when pushing the module in!** Failure to heed this instruction may result in damage to the module and/or chassis.
3. Once the module has reached the connector block of the system backplane, a little more force will be required to insert the module into the connector block. Ensure that the module is locked securely into place and that the faceplate of the module is flush with that of the adjacent modules or cover plates.
4. Insert and tighten the two Torx screws with a **max. torque of 0.6 Nm**.

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

7 Status Monitoring of the IMS-LNO

The status menu provides detailed status monitoring options for the IMS-LNO. To do so, select the menu *I/O-Config* → *Status* in the web interface.

All values monitored by the microprocessor of the IMS-LNO are displayed here in detail.

▼ Status

LNO - Low Noise Output 1 [Chassis 0, Slot IO1]

Temperature Sensor 1 Current: 37.00°C	Temperature Sensor 2 Current: 40.50°C	Voltage Sensor 1 Status: Enabled Current: 2.49V	Voltage Sensor 2 Status: Enabled Current: 2.53V	Voltage Sensor 3 Status: Enabled Current: 2.50V	Voltage Sensor 4 Status: Enabled Current: 2.50V	PLL Sensor 1 Max. Sine Level: 2.39V PLL is locked: Yes
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Reference values:

A comparison of the expected voltage values at the respective power levels is given below.

	dBm	V _{pp}
5 dBm Variante (5 dBm +/- 1)	4	1,0 V
	5	1,1 V
	6	1,3 V

8 dBm Variante (8 dBm +/- 1)	7	1,4 V
	8	1,6 V
	9	1,8 V

12 dBm Variante (12 dBm +/- 1)	11	2,2 V
	12	2,5 V
	13	2,8 V

8 RoHS and WEEE

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

We hereby declare that this product is compliant with the European Union Directive 2011/65/EU and its delegated directive 2015/863/EU "Restrictions of Hazardous Substances in Electrical and Electronic Equipment" and that no impermissible substances are present in our products pursuant to these Directives. We warrant that our electrical and electronic products sold in the EU do not contain lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls (PBBs), polybrominated diphenyl ethers (PBDEs), bis(2-ethylhexyl)phthalat (DEHP), benzyl butyl phthalate (BBP), dibutyl phthalate (DBP), or diisobutyl phthalate (DIBP) above the legal limits.



WEEE Status of the Product

This product is handled as a B2B (Business to Business) category product. To ensure that the product is disposed of in a WEEE-compliant fashion, it may be returned to the manufacturer. In this case, the shipping costs are to be borne by the customer, while Meinberg will cover the costs for disposal.

