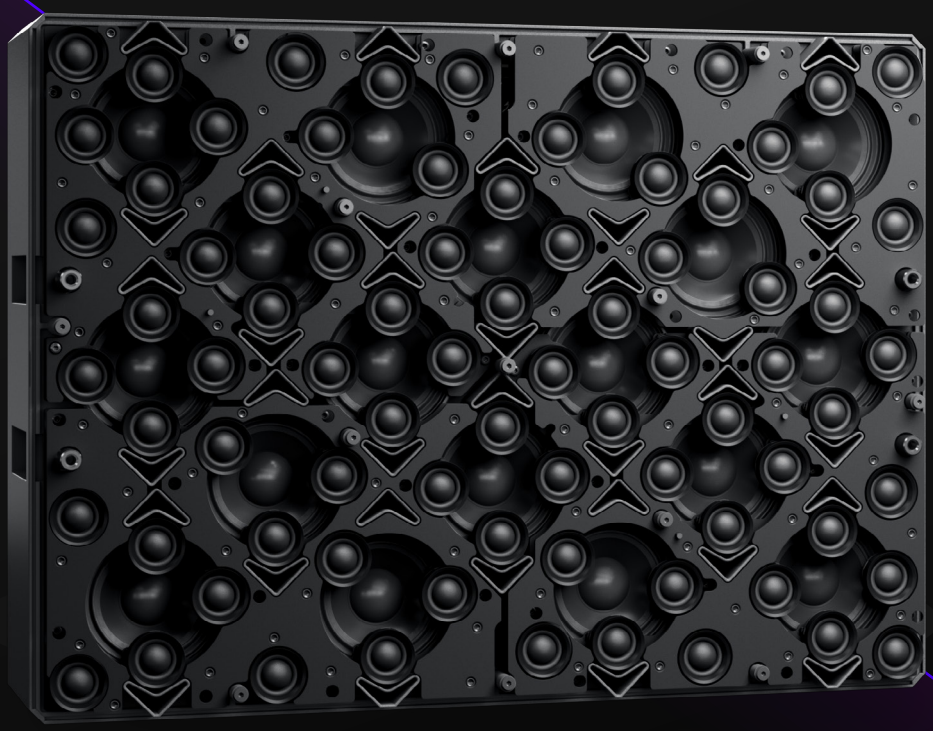
HOLOPLOT



HOLOPLOT X1

Modul 96

User Manual / Version 1.0 en

HOLOPLOT X1 Modul 96
User Manual — Version: 1.0 en
05/2021

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Table of Contents

How to use this Manual

Read these instructions in their entirety before handling or using a HOLOPLOT Audio System. In particular, pay close attention to material related to safety issues. The first section of this document provides a summary of all important safety instructions in two languages, English and French.

The following symbols indicate important safety-related instructions or warnings provided in this manual or on the product itself:

Important operating instructions
Instructions d'utilisation importantes

Dangerous voltage: Risk of electric shock
Risque de choc électrique

Protective earth ground
Terre de protection

As you read these instructions, you will also encounter the following icons indicating complementary information or helpful guidance:

NOTE:
Important knowledge for the topic under discussion as well as references to supplementary information

TIP:
Additional practical advice and helpful explanations

We recommend that you regularly check our website at holoplot.com for updates and supplementary information.

In case of any questions, HOLOPLOT Customer Support is available at:

Tel. (DE): +49 30 4074 5812
Tel. (USA): +1 747 333 5810
Email: help@holoplot.com

Important Safety Instructions

ENGLISH

1. Read and follow these instructions.
2. Heed all warnings.
3. Do not use this device near water. Do not install the device in wet or humid locations. Do not expose this device to rain or moisture. Do not allow water to get inside the device. Do not put objects containing liquid on or near the device.
4. Clean this device only with dry cloth.
5. Do not block any ventilation openings. Do not dress cables in front of intake fans or exhaust cooling vents. Install in accordance with the installation instructions provided in this manual.
6. Do not install near any heat sources such as radiators or heat registers.
7. Avoid direct sunlight to reduce the risk of overheating the device.
8. The Amphenol HP Series 25 connector must not be engaged or disengaged when under load. Either de-energize before disconnecting, or disconnect the other end of the cable.

FRANCAIS

1. Lisez et suivez toutes ces instructions.
2. Tenez compte de tous les avertissements.
3. N'utilisez pas cet appareil à proximité de l'eau. N'installez pas l'appareil dans des endroits humides ou mouillés. N'exposez pas cet appareil à la pluie ou à l'humidité. Ne laissez pas l'eau ou tout autre objet étranger pénétrer dans l'appareil. Ne mettez pas d'objets contenant du liquide sur l'appareil ou à proximité de celui-ci.
4. Nettoyez l'appareil uniquement avec un chiffon sec.
5. N'obstruez pas les ouvertures de ventilation. N'habillez pas les câbles devant les orifices d'admission ou d'évacuation des ventilateurs. Installez l'appareil conformément aux instructions d'installation fournies dans ce manuel.
6. Ne l'installez pas à proximité de sources de chaleur telles que radiateurs ou bouches de chaleur.
7. Pour réduire le risque de surchauffe de l'appareil, évitez de l'exposer à la lumière directe du soleil.
8. Le connecteur Amphenol HP série 25 ne doit pas être engagé ou désengagé lorsqu'il est sous charge ou sous tension. Il faut soit le mettre hors tension avant de le débrancher, soit débrancher l'autre extrémité du câble.

9. Make sure the voltage received by the Audio Module remains within its 115 - 240 V AC operating range. Mains voltages exceeding the specified nominal range can cause damage to the Audio Module.

10. Only use the AC Power OUT at input voltages equal to or higher than 208 V AC to prevent electrical hazards.

11. If the “POWER” LED does not turn green, switch off the AC power source immediately and verify that the voltage is within the required range. If the problem persists, contact HOLOPLOT Customer Support.

12. Before applying AC power to any Audio Module, make sure that the voltage potential difference between neutral and earth ground is less than 5 V.

13. The Audio Module requires a grounded outlet. Always use a grounded outlet and plug. Improper grounding of connections between Audio Modules and other equipment may produce noise, hum, or cause serious damage to the devices’ electronic components.

14. Connect the device to a two-pole, three-wire grounding mains receptacle. The receptacle must be connected to a fuse or circuit breaker. Connection to any other type of receptacle poses a shock hazard and may violate local electrical codes.

15. When wiring AC power cables and distribution systems, preserve AC line polarity and connect the protective earth at both ends of the cable.

16. Protect the power cord from being walked on or pinched, particularly at plugs and convenience receptacles. The AC mains plug or appliance coupler must remain readily accessible for operation.

17. Do not apply power to the device if any power cable is damaged or frayed.

18. Do not exceed the current rating of any branch circuit breaker. Include a 25 % safety buffer.

9. Assurez-vous que la tension reçue par le Module Audio reste dans sa plage de fonctionnement de 115 - 240 V. Les tensions du secteur dépassant la plage nominale spécifiéepeuvent endommager le Module Audio.

10. N’utilisez la sortie AC Power OUT qu’à des tensions d’entrée AC égales ou supérieures à 208 V afin d’éviter tout risque électrique.

11. Si le voyant “POWER” ne devient pas vert, coupez immédiatement l’alimentation en courant alternatif et vérifiez que la tension est dans la plage requise. Si le problème persiste, contactez le support technique de HOLOPLOT.

12. Avant d’appliquer le courant alternatif à un Module Audio, assurez-vous que la différence de potentiel entre le neutre et la terre est inférieure à 5 V.

13. Le Module Audio nécessite une prise de courant avec mise à la terre. Utilisez toujours une prise de courant et une fiche avec mise à la terre. Une mauvaise mise à la terre des connexions entre les Modules Audio et d’autres équipements peut produire du bruit, un bourdonnement ou causer de sérieux dommages aux composants électroniques des appareils.

14. Branchez l’appareil à une prise de courant bipolaire, à trois fils avec mise à la terre. La prise doit être reliée à un fusible ou à un disjoncteur. La connexion à tout autre type de prise de courant présente un risque de choc électrique et peut enfreindre les codes électriques locaux.

15. Lors du câblage des câbles d’alimentation en courant alternatif et des systèmes de distribution, préservez la polarité des lignes de courant alternatif et reliez la terre aux deux extrémités du câble.

16. Protégez le cordon d’alimentation pour éviter qu’on marche dessus ou qu’il soit pincé, en particulier au niveau des fiches et des prises de courant. La fiche secteur ou le coupleur de l’appareil doit rester facilement accessible pour le fonctionnement.

17. Ne faites pas fonctionner l’appareil si le câble d’alimentation est effiloché ou cassé.

18. Ne dépassez pas le courant nominal de tout disjoncteur de dérivation. Incluez un tampon de sécurité de 25 %.

19. For all AC power cables, use the correct cable mount connectors from Amphenol. All connectors must be at least 25 A rated. Use at least AWG-12 wires.

20. The plug on the other end of the AC power cable must be selected in accordance with the relevant requirements of the region in which you will operate the device.

21. To reduce the risk of electric shock, disconnect the device from the AC mains before installing or connecting other cables. Reconnect the power cord only after making all connections.

22. Unplug this device during lightning storms or when unused for long periods of time.

23. Rigging used with this device must comply with the safety instructions in this manual.

24. Disconnect the Modul 96 from power and all other connections before handling/moving/rigging the device.

25. To safely rig a Modul 96, at least four of the eight available M10 rigging points must be used together, and at least two on each side of the Audio Module (left and right). Each rigging screw shall be fixed with an appropriate torque not exceeding 65 Nm.

26. If Audio Modules lack appropriate fixation to the floor or to a secure structure, they might fall or tip. Without fixation, Audio Modules might move due to vibrations caused by the loudspeaker drivers.

27. To prevent electrical or mechanical safety hazards, the device must only be handled, installed, and maintained by suitably trained personnel.

28. Refer all other servicing to HOLOPLOT authorized service personnel. Servicing is required when the device has been damaged in any way, such as when the power supply cord or plug has been damaged; liquid has been spilled or objects have fallen into the device; rain or moisture has entered the device; the device has been dropped; or when for undetermined reasons the device does not operate normally.

19. Pour tous les câbles d'alimentation en courant alternatif, utilisez les connecteurs de montage de câble appropriés d'Amphenol. Tous les connecteurs doivent être au moins de 25 A. Utilisez au moins des fils AWG-12.

20. La fiche d'alimentation située à l'autre extrémité du câble d'alimentation CA doit être choisie en fonction des exigences de la région dans laquelle vous utiliserez l'appareil.

21. Pour réduire le risque de choc électrique, débranchez l'appareil du secteur avant d'installer ou de brancher d'autres câbles. Ne rebranchez le cordon d'alimentation qu'après avoir effectué tous les branchements.

22. Débranchez cet appareil pendant les orages ou lorsqu'il n'est pas utilisé pendant de longues périodes.

23. Les systèmes de fixation utilisés avec cet appareil doivent être conformes aux instructions de sécurité de ce manuel.

24. Débranchez le Modul 96 de l'alimentation et de toutes les autres connexions avant de manipuler/déplacer/fixer l'appareil.

25. Lorsque vous utilisez les points de fixation M10 pour fixer le Module Audio, au moins quatre des huit points de fixation M10 disponibles doivent être utilisés ensemble, et au moins deux de chaque côté du Module Audio (gauche et droite). Chaque ridoir doit être serré avec un couple adéquat ne dépassant pas 65 Nm.

26. Si les Module Audio ne sont pas correctement fixés au sol ou à une structure solide, ils peuvent tomber ou basculer. Sans fixation, les Module Audio peuvent se déplacer en raison des vibrations provoquées par les haut-parleurs.

27. Pour éviter tout risque de sécurité électrique ou mécanique, l'appareil ne doit être manipulé, installé et entretenu que par un personnel qualifié et formé.

28. Confiez toutes les autres opérations d'entretien au personnel de service agréé par HOLOPLOT. L'entretien est nécessaire lorsque le dispositif a été endommagé de quelque manière que ce soit, par exemple lorsque le cordon d'alimentation ou la prise ont été endommagés, qu'un liquide a été renversé ou que des objets sont tombés dans le dispositif, que la pluie ou l'humidité a pénétré dans le dispositif, que le dispositif est tombé ou que, pour des raisons indéterminées, le dispositif ne fonctionne pas normalement.

29. Do not attempt to disassemble the device. Do not remove the loudspeaker grille. Opening the device will void the warranty.

30. Exposure to high sound pressure levels can cause permanent hearing loss. Use adequate protection such as ear plugs or protective earphones, when exposed to high levels of acoustic pressure (see data sheet at the end of this manual for the maximum sound pressure level this device can produce).

29. N'essayez pas de démonter l'appareil. Ne retirez pas la grille du haut-parleur. L'ouverture de l'appareil annulera la garantie.

30. L'exposition à des niveaux de pression sonore élevés peut entraîner une perte auditive permanente. Utilisez une protection adéquate, telle que des bouchons d'oreille ou des écouteurs de protection, lorsque vous êtes exposé à des niveaux élevés de pression acoustique (voir la fiche technique à la fin de ce manuel pour connaître le niveau de pression acoustique maximal que cet appareil peut produire).

HOLOPLOT Audio System

A HOLOPLOT Audio System consists of:

- **AUDIO MODULES** – 3D Audio-Beamforming and Wave Field Synthesis loudspeakers
- **CONTROLLER** – a rack-mountable device to manage HOLOPLOT Audio Modules
- **SOFTWARE SUITE** – for design and simulation, control and monitoring, as well as authoring of object-based audio content and playback for HOLOPLOT Audio Systems

AUDIO MODULES

HOLOPLOT Audio Modules are 3D Audio-Beamforming and Wave Field Synthesis loudspeakers with integrated signal processing and amplification that can be arrayed horizontally and vertically to create differently sized HOLOPLOT Matrix Arrays.

The two HOLOPLOT X1 Audio Modules, “Modul 96” (MD96) and “Modul 80-S” (MD80-S), are targeted at high-performance audio applications. All HOLOPLOT X1 Audio Modules are identical in width, height, and rigging system, but differ in depth, weight, and frequency range. The MD96 is a two-way Audio Module with 96 loudspeaker drivers; the MD80-S is a three-way Audio Module with 80 loudspeaker drivers and a single sensor-controlled subwoofer driver.

In HOLOPLOT Audio Modules, each loudspeaker driver is individually amplified and controlled by its own Digital Signal Processor (DSP), enabling ultimate control over sound. HOLOPLOT Audio Modules are capable of generating multiple sound fields simultaneously – each with its own content, equalization, level, shape, and position – either in a single Audio Module deployment or as part of a larger HOLOPLOT Matrix Array system.

Each Audio Module provides digital audio connectivity through Audinate Dante – up to 200 channel-based or object-based audio content streams can be received by one Audio Module, processed in parallel, and mapped to, or panned between multiple sound fields.

HOLOPLOT X1
Modul 96

HOLOPLOT X1
Modul 80-S

CONTROLLER

The HOLOPLOT Controller manages a HOLOPLOT Audio System through a standard IP network, providing different functionalities: general system control, collection of system health and performance data, as well as sound field control.

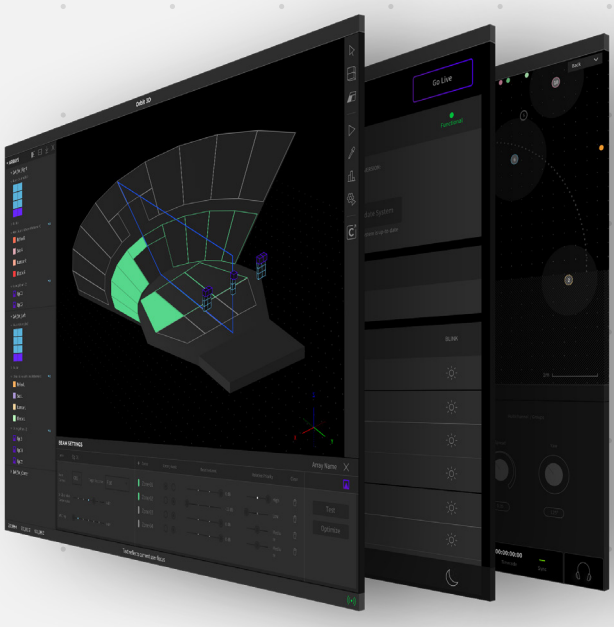
The HOLOPLOT Controller is based on a Dell PowerEdge XR2 Industrial Rack Server and is a 19-inch 1U standard rack-mountable device.

SOFTWARE SUITE

HOLOPLOT Plan makes the design, simulation, and set-up of a HOLOPLOT Audio System simple and intuitive. The 3D graphic interface allows users to design Matrix Arrays of different configurations and create sound fields based on 3D Audio-Beamforming and Wave Field Synthesis technology. Venue models are easily imported from standard 3D modeling software such as SketchUp. *HOLOPLOT Plan* also simulates and visualizes direct sound pressure levels, giving a realistic prediction of the audio quality in the venue. For further analysis and advanced simulations, projects can be exported to EASE.

HOLOPLOT Control makes managing and operating a HOLOPLOT Audio System efficient and hassle-free. As a first-level gateway to the system, it provides critical diagnostic information and allows users to easily locate Matrix Arrays within the venue, control volume and equalization, and monitor performance. By displaying essential system data (such as component health or network status), *HOLOPLOT Control* aids technical staff in operating and maintaining the entire system.

HOLOPLOT Create is a complete solution for production of object-based audio content. It enables creators to produce transformational audio experiences with immersive sound objects integrated and designed for HOLOPLOT Matrix Arrays. Audio object properties can be controlled via standard DAW automation (plug-in in AU and VST3 format), and by third-party devices via the OSC (Open Sound Control) protocol.



CONNECTED SERVICES

Given an active internet connection, a HOLOPLOT Audio System will have access to the HOLOPLOT Cloud and IoT-enabled HOLOPLOT services.

The optional Connected Services allow the HOLOPLOT service team or HOLOPLOT affiliated service teams to access a HOLOPLOT installation for remote monitoring and remote failure analysis, enabling efficient and targeted technical support as well as prediction of maintenance service intervals.

Furthermore, Connected Services provide HOLOPLOT Audio Systems with software updates and upgrades for improved performance and security as well as new features — making the system better over time.

HOLOPLOT Sound Field Control

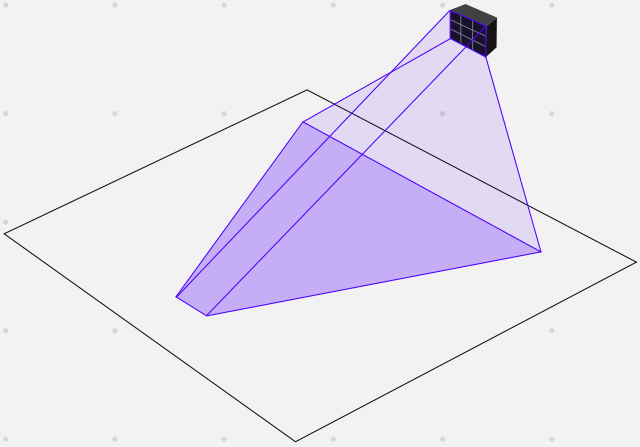
A HOLOPLOT Audio System can be deployed as single, or multiple arrays of HOLOPLOT Audio Modules. Each array of Audio Modules can simultaneously generate multiple sound fields based on two HOLOPLOT core technologies: 3D Audio-Beamforming and Wave Field Synthesis – each with its own characteristics and advantages.

3D AUDIO-BEAMFORMING
OPTIMIZED SOUND FOR AUDIENCE AREAS

HOLOPLOT 3D Audio-Beamforming enables the control of sound wave propagation by adjusting the vertical and horizontal steering angle and the vertical and horizontal opening angles. The sound field of a HOLOPLOT Matrix Array can be configured individually to adapt to an installation's requirements, even when facing complex-shaped environments or challenging room acoustics.

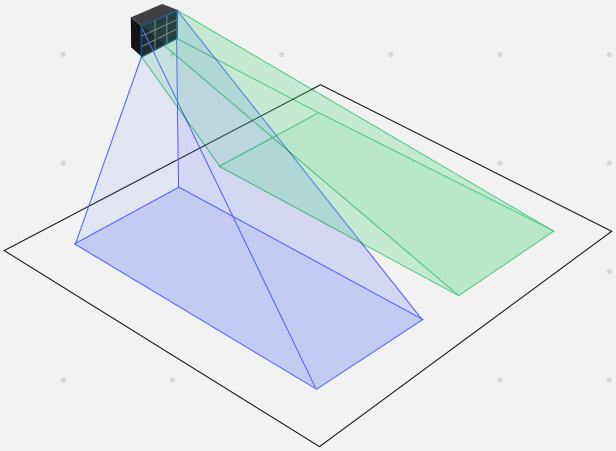
A sound field based on HOLOPLOT 3D Audio-Beamforming technology is usually deployed to provide the following:

- uniformity of coverage (spectral consistency over a predefined audience area)
- improved speech intelligibility
- reduced unwanted sound spill onto stages and into neighboring residential areas
- eliminated sound from reflective surfaces, reducing the creation of acoustic echo and minimizing room reverberation artifacts



When generating a sound field based on 3D Audio-Beamforming technology, signal processing coefficients for each loudspeaker driver are algorithmically optimized depending on the target audience area, the Audio Modules' locations, as well as areas in the respective architectural surrounding of the array that shall be actively avoided by the sound field.

A single HOLOPLOT Matrix Array can simultaneously create multiple optimized 3D Audio-Beamforming sound fields, targeting different areas and reproducing different content for each of these areas. The 3D Audio-Beamforming capabilities of a HOLOPLOT Matrix Array are dependent on the size of the array.



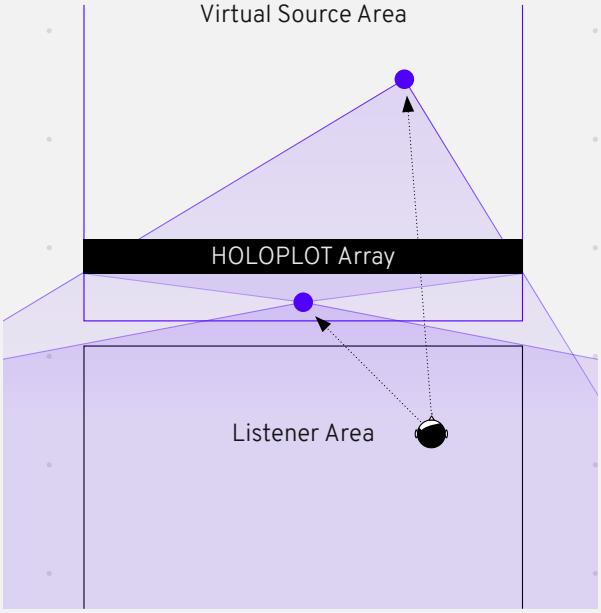
WAVE FIELD SYNTHESIS
ACCURATE LOCALIZATION
FOR LISTENERS

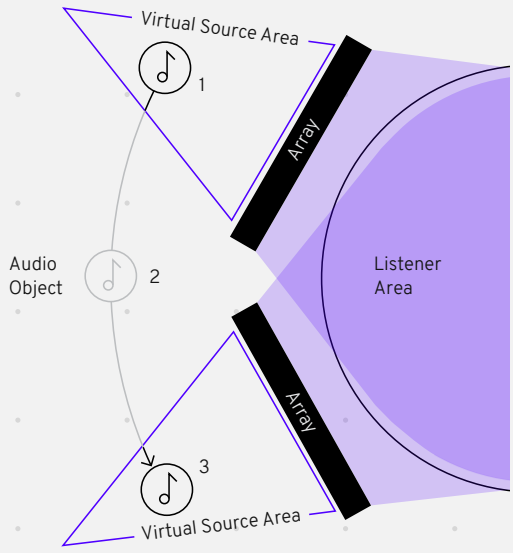
In creative applications, a Wave Field Synthesis sound field is usually deployed to create a distinctly localized sound source. Such a virtual sound source usually has a point-shaped origin behind or in front of a HOLOPLOT Matrix Array, which in this case creates a spherically propagating sound field.

A single HOLOPLOT Matrix Array can create multiple sound fields simultaneously, each producing different content, enabling the creation of auditory scenes with multiple localized sound sources.

Because sound fields created by Wave Field Synthesis are based on parametric coefficients which can be dynamically adjusted, the sound source origin location of a sound field can be changed, resulting in a corresponding perceived change of the localization of the sound source for listeners.

HOLOPLOT Wave Field Synthesis can be deployed in conjunction with HOLOPLOT 3D Audio-Beamforming capabilities. These technologies provide users with a vastly augmented creative palette compared to traditional loudspeaker systems.





PANNING OBJECT-BASED AUDIO

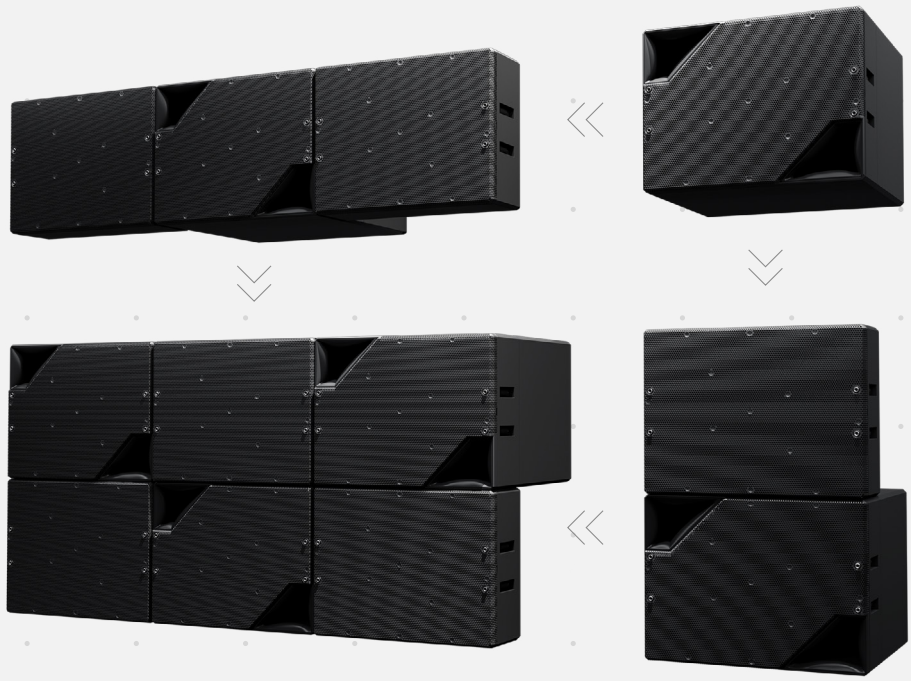
Similar to panning content between traditional loudspeakers, which creates phantom sources that can be localized between loudspeaker locations, content can also be panned between sound fields generated by a HOLOPLOT Audio System, no matter if those are based on 3D Audio-Beamforming or Wave Field Synthesis. The content can be panned between individual sound fields created from a single HOLOPLOT Matrix Array, and also between sound fields created from multiple, distributed arrays.

HOLOPLOT Audio Systems simultaneously support both traditional channel-based and object-based content. Object-based content can be authored, played back, and spatialized either with *HOLOPLOT Create* or by employing a third-party spatializer where compatible.

MATRIX ARRAY SIZE

A single HOLOPLOT Audio Module is capable of creating multiple optimized 3D Audio-Beamforming as well as Wave Field Synthesis sound fields. The larger an array of Audio Modules, the greater the control over its sound field in low frequencies. Furthermore, an increased array size allows for higher SPL broadband values, improves coverage homogeneity in high frequencies, and reduces sound spill outside the targeted area.

Sound fields created with HOLOPLOT Matrix Arrays are controllable independently horizontally and vertically. The upper control frequency is dependent on the beam configuration. The respective amount of control in low frequencies is dependent on the array size in the corresponding axis.



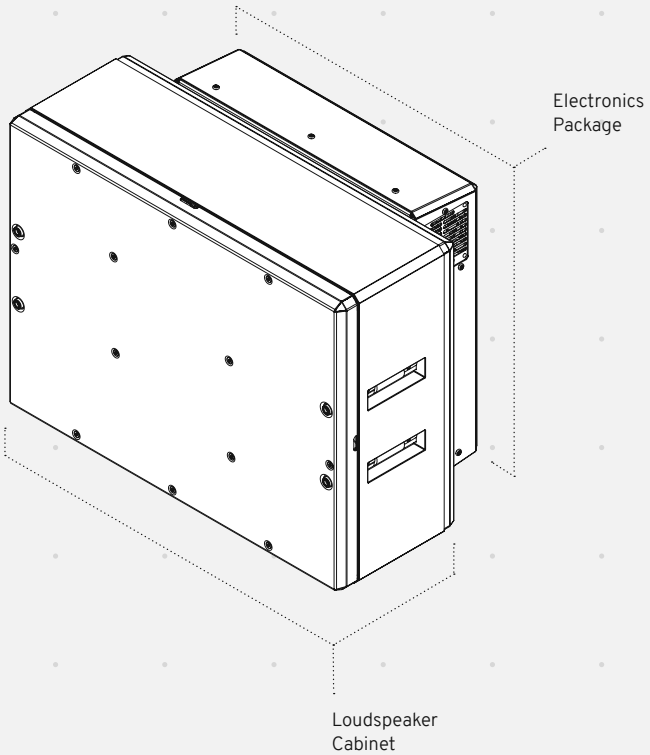
X1 Modul 96

The Modul 96 (MD96) is the slimmer of the two HOLOPLOT X1 Audio Modules. The two-way Audio Module integrates 96 loudspeaker drivers in a two-layered matrix configuration. Thanks to its 78 silk-dome tweeters in the first matrix layer, the MD96 delivers sound in a studio-like brilliance.

By combining the latest technological advancements in DSP algorithms with high-performance sound reproduction capabilities, the MD96 enables the use of 3D Audio-Beamforming and Wavefield Synthesis in a variety of ambitious applications.

AUDIO MODULE OVERVIEW

The front-facing part of the MD96, the “Loudspeaker Cabinet” integrates loudspeaker drivers, sensors, and rigging-points. The rear-facing part, the “Electronics Package” integrates power supplies, amplification, signal processing, and networking electronics.



THE LOUDSPEAKER CABINET

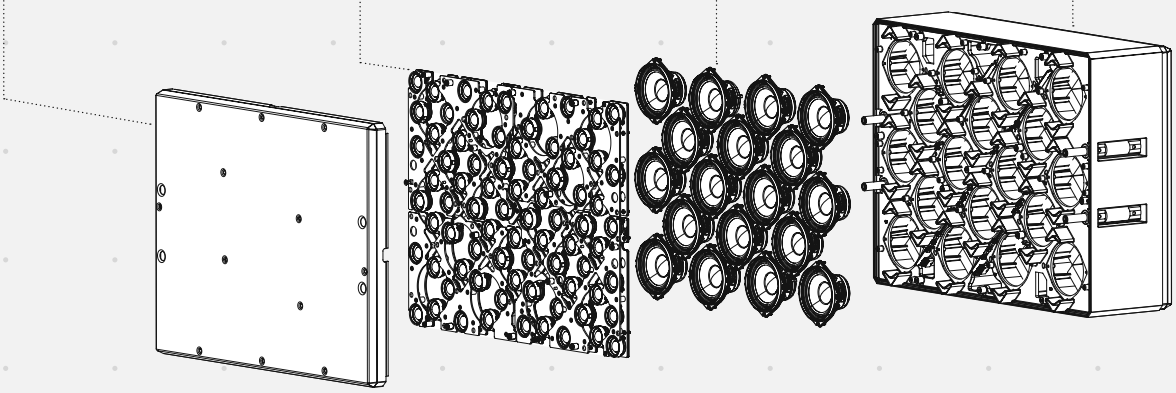
The Loudspeaker Cabinet of the MD96 is constructed of an enclosure made of glass fiber-reinforced polycarbonate.

Metal grille and hydrophobic, damp, and dust repellent acoustic cloth - protecting the HF and LF drivers

78x 1.3-inch high-frequency soft-dome loudspeaker drivers coupled with individual wave guides — delivering powerful sound with a studio-grade brilliance

18x 5-inch low-frequency cone loudspeaker drivers in individual dual-ported chambers

Glass fiber-reinforced polycarbonate enclosure

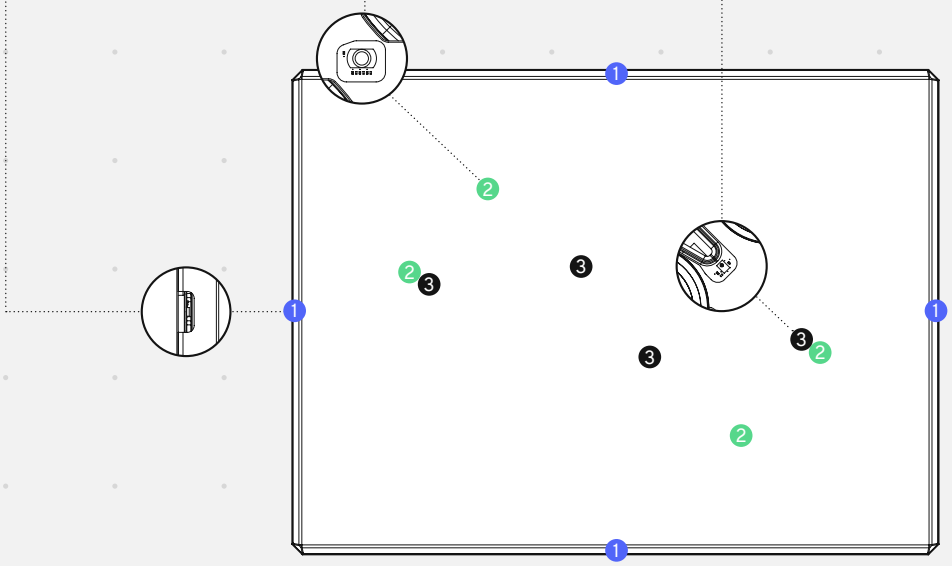


The MD96 integrates the following active electronic components in its glass fiber polycarbonate enclosure:

1. 4x infrared transceivers — enabling an Audio Module to identify its location within an array

2. 4x front-facing RGB LEDs — for easily locating the Audio Module in the venue

3. 4x digital microphones — for quality control of the loudspeaker drivers



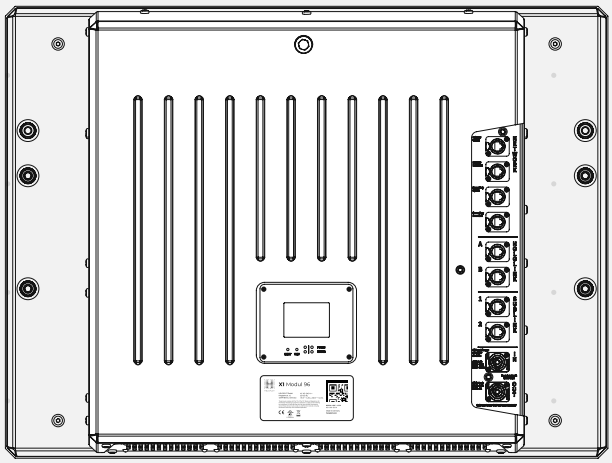
Further features:

- 2x temperature sensors — each monitoring a low-frequency loudspeaker drivers' magnet assembly
- 2x temperature sensors — each monitoring a high-frequency loudspeaker drivers' magnet assembly
- 2x orientation sensors — detecting Audio Module's orientation

THE ELECTRONICS PACKAGE

The Electronics Package is fabricated of aluminum alloy and houses the main electronic components. It is both the brain and powerhouse of the Audio Module, integrating processor and amplification.

The Electronics Package connects to the Loudspeaker Cabinet through two 108-pin connectors, which carry the amplified loudspeaker signals, a digital bus, and power for the active electronic components in the front of the Audio Module.

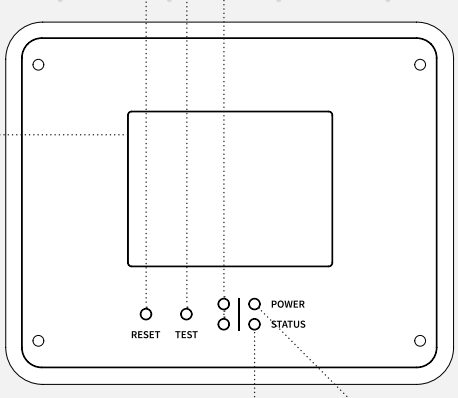


The Electronics Package integrates:

- 6x 16-channel digital amplifier modules — providing individual amplification and DSP control to each of the 96 drivers
- 2x AC to DC amplifier “Smart Rail” power supply modules
- 2x DC amplifier energy storage modules
- the “Core” — integrating a processing module combining a high-performance Field Programmable Gate Array (FPGA) and a dual-core ARM® Cortex™-A9, with an independent AC to DC ancillary power supply
- an optional “Dante Module” — providing Dante audio networking connectivity
- 8x temperature-controlled fans — actively cooling the Electronics Package
- the “Display Panel” — providing information on the Audio Module’s ID and status

THE DISPLAY PANEL

The backside of the Electronics Package integrates the Display Panel, which displays Audio Module status and error messages, and provides basic information like IP addresses and firmware version. The resistive touch screen responds to pressure and therefore can be operated by a fingertip, even when wearing gloves, or by an appropriate stylus tip (pen).



“Test” pin-hole switch

“Reset” pin-hole switch

2x LEDs for contextual Audio Module status display

- the upper LED lights up blue when Audio Module is in factory mode
- the lower LED mirrors the behavior of the four RGB LEDs on the front of the Loudspeaker Cabinet

3.5” TFT color touch screen with a resolution of 320 x 240 pixels screen: displays the serial number, firmware version, IP addresses, Audio Module state, and error messages in case a fault was detected

LED labeled “STATUS” for general Audio Module status indication, which lights up red if an error is detected and is off otherwise

LED labeled “POWER” for Audio Module power status indication, which lights up green as soon as the Audio Module is powered on

The touch screen utilizes a thin flexible sheet that may be damaged by sharp objects or heavy treatment.

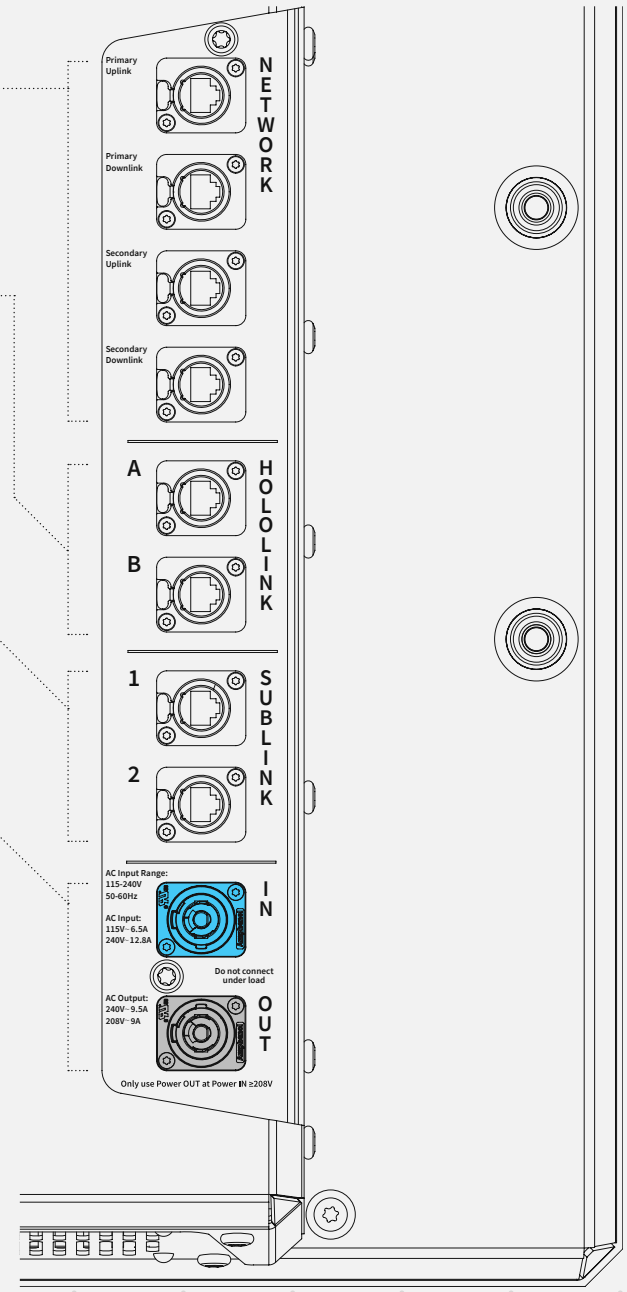
THE CONNECTOR PANELS

Control Network & Dante Audio Network
Four etherCON standard RJ45 networking connections for redundant control and Dante audio networking connectivity: two for primary up- and downlink, and two for secondary up- and downlink.

Hololink
HoloLink connectors carry HOLOPLOT proprietary audio networking protocols, used for special purposes.

SubLink
Two SubLink etherCON RJ45 networking connections which can be utilized to provide audio signal to standalone Subwoofer Modules offered by HOLOPLOT in the future. SubLink connectors carry HOLOPLOT proprietary audio networking protocols.

Power connections
An Amphenol HP-3-MDQ AC Power IN connector providing AC power to the Audio Module and an Amphenol HP-3-MDGQ connector for AC Power OUT enabling daisy-chaining power.



Installation Requirements and Recommendations

HANDLING THE AUDIO MODULE

STORING

Audio Modules shall be contained in their packaging or travel cases to protect from damage, until installation.

INSTALLATION

- Audio Modules shall be kept on a flat, even, and stable surface with sufficient load-carrying capacity, to prevent them falling or tipping.
- Audio Modules shall not be lifted by any other means than the rigging points identified.
- Audio Modules shall only be ‘stood’ on the bottom, top, or sides. They shall not be stood on the Electronics Package (rear of Audio Module) or front grille. Standing in any other way can damage the Audio Module.

The Audio Module might tip if not appropriately fixed.

The Modul 96 is a heavy device and should not be carried by operators, or handled without suitable equipment.

Disconnect the Modul 96 from power and all other connections before handling/moving/rigging the device.

RIGGING THE AUDIO MODULE

HOLOPLOT currently does not offer any rigging accessories for X1 Audio Modules. The following information is intended to enable a third party to design a custom rigging system.

3D CAD files and additional technical drawings of the Audio Modules are available from HOLOPLOT on request.

IMPORTANT SAFETY AND LEGAL NOTE:
A rigging system must be designed and used in accordance with local, state, federal, and industry regulations. It is the installer's responsibility to evaluate the reliability of any rigging method for their application. Rigging should only be designed and carried out by experienced and appropriately qualified professionals. Any rigging design must be verified and approved by a qualified structural engineer.

HOLOPLOT cannot take any liability and responsibility for any custom rigging system.

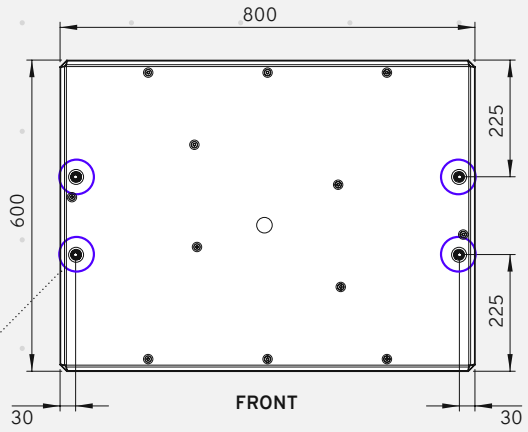
RIGGING POINTS

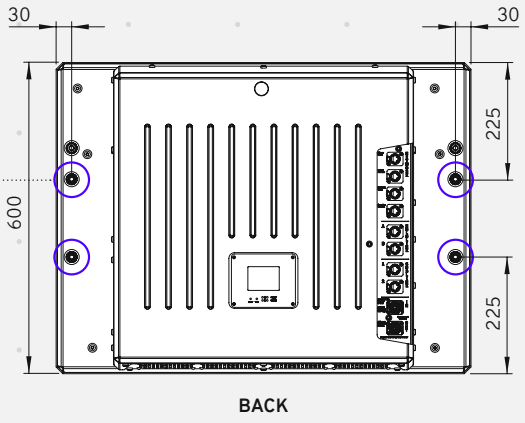
The Modul 96 provides eight M10x1.5 threaded rigging attachment points made of stainless steel (EN 1.4305 / AISI 303), four front-facing and four rear-facing. The M10x1.5 threads are integrated on both ends of four so-called "Suspension Bolts" that are integrated into the Loudspeaker Cabinet. These rigging points are intended for direct attachment to a rigid rigging system, and for supporting the Audio Module.

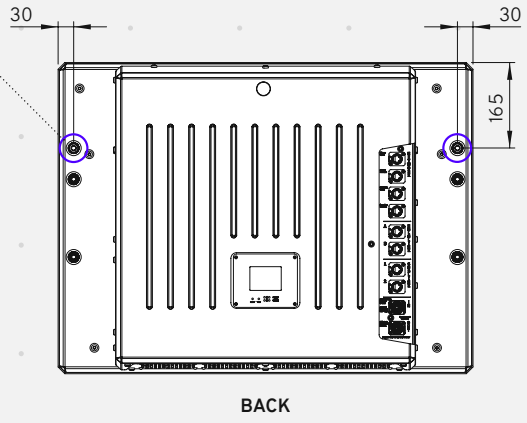
There are two additional M10x1.5 threaded safety points (EN 1.4305 / AISI 303) integrated on the back of the Audio Module for secondary safety cable attachment (optional).

To safely rig a Modul 96, at least four of the eight available M10 rigging points must be used together, and at least two on each side of the Audio Module (left and right). Each rigging screw shall be fixed with an appropriate torque not exceeding 65 Nm.

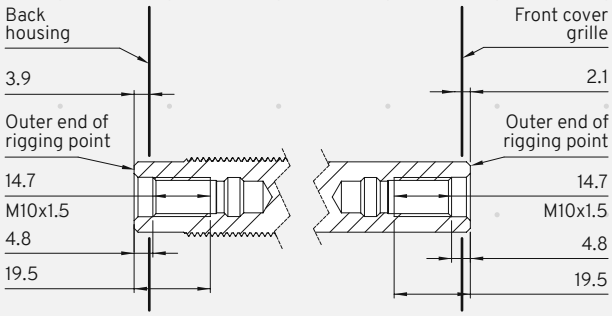
All measurements given in mm







The eight M10 rigging points as well as the two additional M10 safety points are threaded to a depth of 19.5 mm. The threads are recessed by ca. 4 mm from the outer surface. Hence, ensure the M10 fasteners used are long enough to engage sufficiently with the threads, but do not exceed 18 mm depth into the Audio Module from the outer surface.



AREAS NOT TO BE COVERED

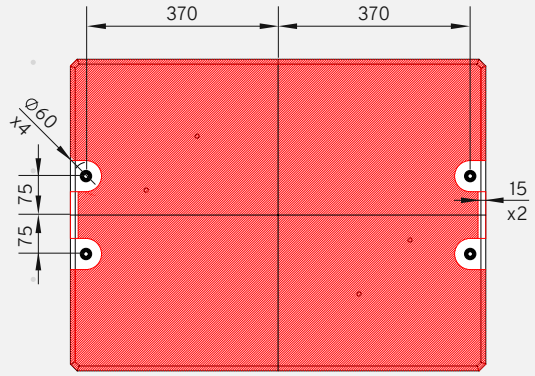
To ensure best performance of a HOLOPLOT Audio Module, a rigging system should not cover any of the loudspeaker drivers at the front of the Audio Module.

Furthermore, when designing a rigging system for an array of Audio Modules, the four infrared transceivers on the sides of the Audio Module should not be covered. Obstructing these sensors will prevent the Audio Module from automatically recognizing and configuring its position within an array.

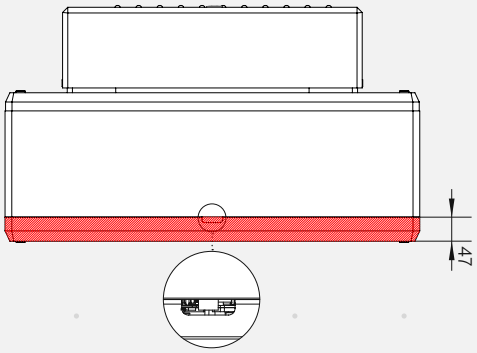
This is especially relevant for larger arrays in order to reduce setup time. Single module deployments do not require any array configuration.

In case automatic configuration is not available due to obstructed infrared transceivers, the Audio Module position can be configured manually via *HOLOPLOT Plan*.

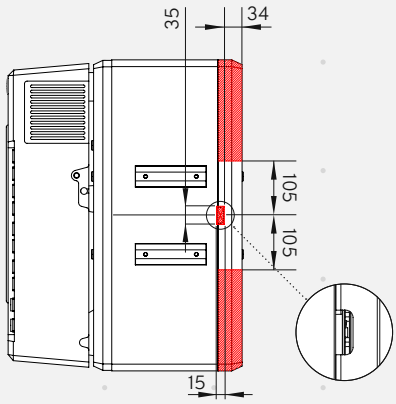
The areas not to be covered are shown in red in the following illustrations, along with relevant dimensions.



FRONT



TOP / BOTTOM

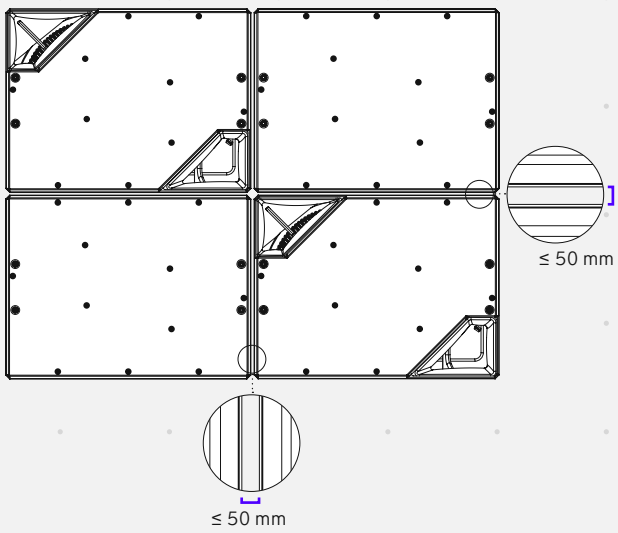


LEFT / RIGHT

DISTANCES BETWEEN AUDIO MODULES

Optimal performance of Matrix Arrays requires a consistent spacing between loudspeaker drivers across multiple Audio Modules.

Hence, when designing a rigging system for an array of X1 Audio Modules, reduce the distance between individual Audio Modules to a minimum. The distance should not exceed 50 mm in any of the axes, horizontal and vertical.

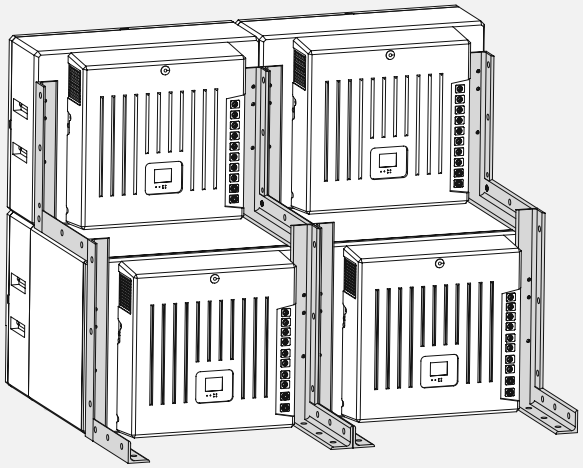


GROUND STACKING

Up to five Audio Modules can be stacked on top of each other. Ground stacking requires a flat, even, and stable surface with sufficient load-carrying capacity.

Use all four rear-facing M10 rigging points to secure the stacked Audio Modules from the back.

When stacking Audio Modules of different types, place the slimmer MD96 on top of the larger MD80-S. When the array configuration requires placing an MD80-S on top of an MD96, ensure appropriate stabilization through an external structure.



IMPORTANT SAFETY AND LEGAL NOTE:
This drawing is for illustrative purposes only. Any custom rigging, including structures supporting ground stacking, must be designed, verified, and approved by a qualified structural engineer.

If Audio Modules lack appropriate fixation to the floor or to a secure structure, they might fall or tip.

Without fixation, Audio Modules might move due to vibrations caused by the loudspeaker drivers.

HEAT GENERATION AND DISSIPATION

All power used by a loudspeaker system is eventually converted to heat dissipated by amplifiers and drivers. Acoustic power is absorbed and converted to heat by air and acoustic materials.

In Sleep and Idle modes, all heat is dissipated towards the back of the Audio Module. When playing audio, heat is dissipated with a 60/40 front/back spread.

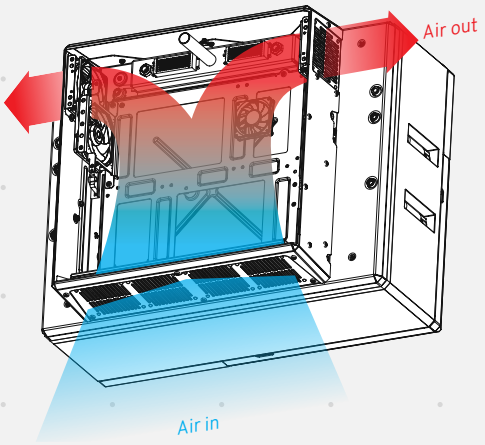
Heat dissipation of Modul 96 in different power states

POWER STATE	Sleep Mode	Idle	Max. Long-Term Continuous		
DIRECTION	Back	Back	Front	Back	Total
BTU/H	409	1,024	1,331	887	2,218
W	120	300	390	260	650

Please also refer to the Power States and Current/Power Draw in the Power Setup and Requirements section for more information on the Power States.

COOLING AND AIR FLOW REQUIREMENTS

The internal components of the Electronics Package are actively cooled by eight temperature-controlled fans. To provide adequate cooling capabilities, the back of the Audio Module is required to have access to cool air and may not be sealed by surrounding infrastructure.



To prevent overheating, ensure sufficient airflow around the back and sides of the Electronics Package. Do not block the intake fans at the bottom nor the exhaust cooling vents on the sides. Do not dress cables in front of intake fans or exhaust cooling vents.

CLEARANCE REQUIRED AT THE BACK

For connectors and cable dress, there must be at least 100 mm clearance on the back of an Audio Module.

Power Setup and Requirements

In order to ensure the safe operation of the Modul 96, it is critical to understand power distribution, voltage and current requirements, and electrical safety guidelines.

AC POWER DISTRIBUTION REQUIREMENTS

The Audio Module and any equipment connected to it (network switches, subwoofer amplifier modules) must be properly connected to the AC power distribution, preserving AC line polarity. Every grounding point must be connected to a single node or common point using the same cable gauge as the neutral and line cable.

Improper grounding of connections between Audio Modules and other equipment may produce noise, hum, or cause serious damage to the devices' electronic components.

When powering the Electronics Package and the subwoofer amplifier module from two different power sources / wall sockets, make sure that both power sources provide the same ground potential.

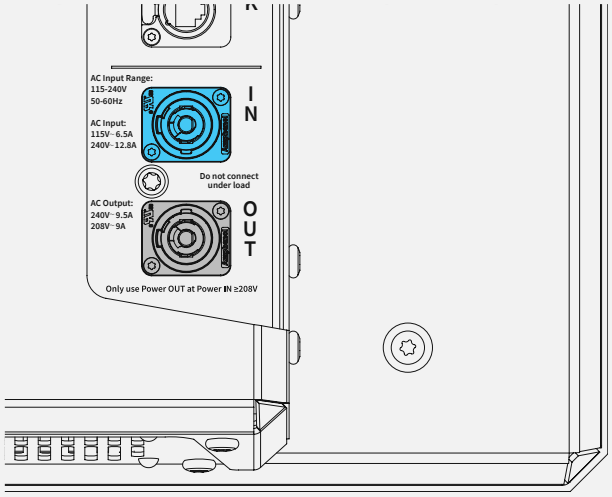
Before applying AC power to any Audio Module, make sure that the voltage potential difference between neutral and earth ground is less than 5 V.

Ensure the voltage received by the Audio Module remains within its 115 - 240 V operating range. In addition, the ground line must always be used for safety reasons and the line-to-ground voltage should never exceed 240 V.

AC POWER CONNECTORS

The Audio Module MD96 includes two Amphenol HP Series 25 connectors on the Electronics Package connector panel, one for AC Power IN.

The 3-conductor Amphenol HP Series 25 is rated at 25 A and uses a locking connector that prevents accidental disconnections.



Do not connect or disconnect the Amphenol HP Series 25 connectors under load.

AC POWER IN (BLUE)

The blue AC Power IN connector supplies power to the Audio Module.

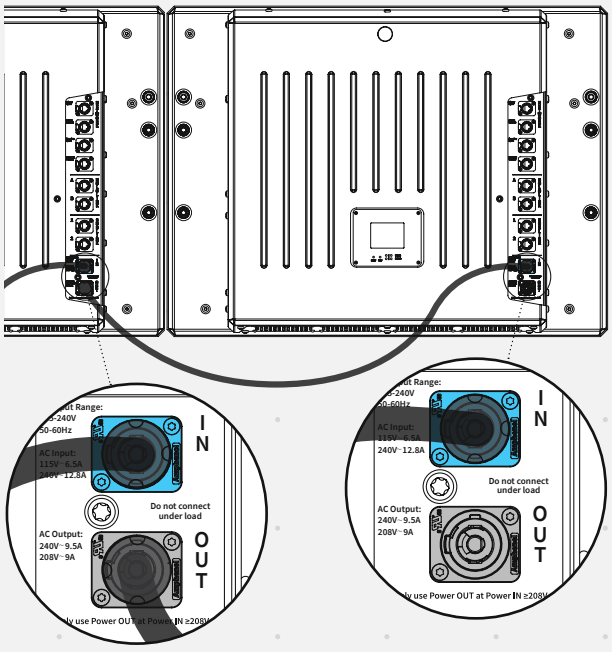
Make sure to use a cable with the correct diameter (according to cable length) and with a power plug on the other end intended for use in the region where the Audio Module will be operated.

AC POWER OUT (GRAY)

The gray AC Power OUT connector allows two Audio Modules to be looped and powered from a single power source.

In order to power two MD96 on a single power source (at AC Input voltages equal or higher than 208 V), connect the AC Power OUT of the first Audio Module to the AC Power IN of the second Audio Module.

If Power IN ≥ 208 V AC



For this purpose, a dedicated 3-meter AC Amphenol HP Series 25 to Amphenol HP Series 25 interconnecting cable is available from HOLOPLOT as an accessory (P/N: H42-056-50-C1).

Only use the AC Power OUT at AC input voltages equal to or higher than 208 V to prevent electrical hazards

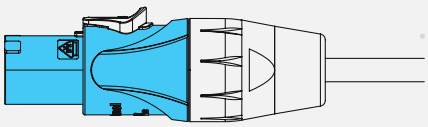
AC POWER CABLE REQUIREMENTS

The Audio Modules require that all AC power cables and interconnecting cables have AWG-12 wires. For that purpose, only use the following Amphenol HP Series cable mount connectors:

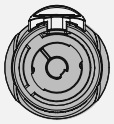
- For Power IN: Amphenol HP-3-FJ
- For Power OUT: Amphenol HP-3-FGJ

Third-party AC power and interconnecting cables can be used if they satisfy the “AC Power Distribution Requirements”, and the cable and terminating connectors are rated accordingly.

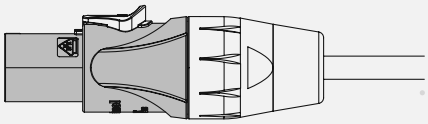
FJ front



FJ side



FGJ front



FGJ side

For all AC power cables, use the correct cable mount connectors from Amphenol. All connectors must be at least 25 A rated. Use at least AWG-12 wires.

When wiring AC power cables and distribution systems, preserve AC line polarity and connect the protective earth at both ends of the cable. The Audio Module requires a grounded connection. Always use a grounded outlet and plug. It is extremely important that the system is properly grounded to operate safely and properly. Do not ground-lift the AC cable.

VOLTAGE REQUIREMENTS

The Audio Modules operates as intended and with no audio discontinuity when the AC voltage stays within a nominal range of 115 - 240 V at 50 or 60 Hz. Make sure that your AC main connections are capable of satisfying the power rating.

Mains voltages exceeding the specified nominal range can damage the Audio Module or shorten component life.

POWER STATES AND CURRENT/POWER DRAW

The Modul 96 has the following power states:

- **Sleep Mode:** the Audio Module's control electronics receive power but amplifiers and their power supplies are turned off to save energy
- **Idle:** the Audio Module is fully functional and ready to play sound, but no signal is applied
- **Max. Long-Term Continuous (Max. Cont.):** playing a pink-noise signal with a 12 dB crest factor, at an rms current that can be sustained indefinitely
- **Max. Short-Term (Max. Short):** maximum rms current while playing an unclipped pink-noise signal with a 12 dB crest factor for a limited time

Current draw for Audio Modules is dynamic and fluctuates as operating levels and program signal change. It is important to understand the current ratings of each power state and how they affect circuit breaker and cable specifications. Use the information provided below as a guide for selecting the gauge of cables and the circuit breaker ratings for the system's operating voltage.

The Audio Module can be put in "Sleep mode" using the *HOLOPLOT Control*.

Current draw and input power of the Modul 96 in different power states

	120 V AC	208 V AC	230 V AC	Input Power
SLEEP MODE	0.4 A rms	0.5 A rms	0.5 A rms	120 W
IDLE	1.7 A rms	1.4 A rms	1.3 A rms	300 W
CONTINUOUS	5.3 A rms	3.1 A rms	2.8 A rms	650 W
MAX POWER	12.6 A rms	6.9 A rms	6.3 A rms	1,450 W

PROTECTION CIRCUITRY

The Audio Module is equipped with several power-related protection circuits to prevent damage to the Audio Module or the power distribution system:

- A power supply charging rate regulator ensures that in-rush currents do not exceed the Maximum Input Peak Current (MIPC) limit.
- A power supply capacity-based limiter regulates the peak level of the audio signal, preventing amplifiers from shutting down if the amplifier power supplies are depleted (amplifier brown-out protection).
- Various current and voltage limiters protect drivers from excessive excursion and excessive voice coil temperature.
- A thermal limiter protects the amplifiers from excessive temperature. Amplifiers shut down at internal temperature values exceeding 70° C.

INTELLIGENT AC POWER SUPPLY

The Audio Module's intelligent AC power supply automatically selects the correct operating voltage (allowing the Audio Module to be used internationally without manually setting voltage switches) and eliminates high in-rush currents with a soft-start power-up.

Network Setup and Requirements

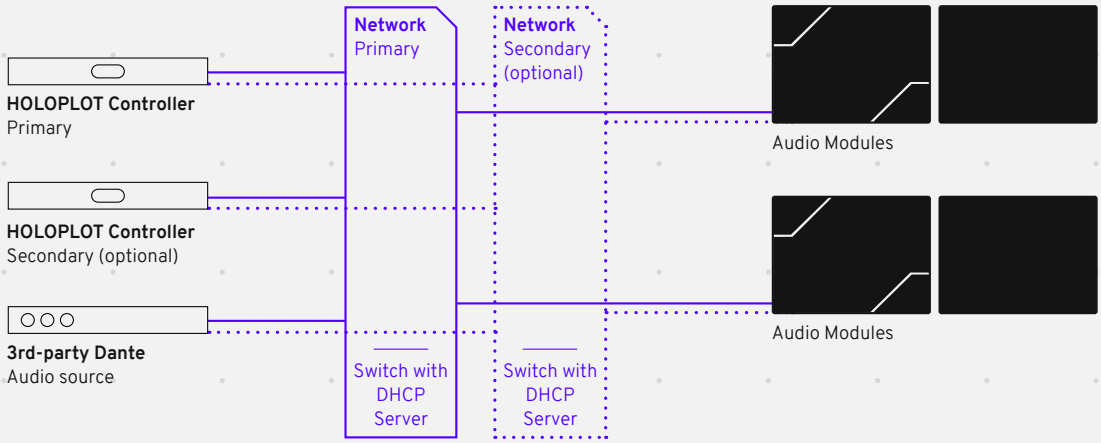
NETWORK DESIGN

The Modul 96 provides four etherCON standard RJ45 networking connections for redundant control and Dante audio networking connectivity. These can be used to establish a redundant networking topology for both audio and control networks (primary and secondary), utilizing parallel Ethernet switches and DHCP servers.

All HOLOPLOT Audio Modules are stateless, i.e. without a control network connection to the HOLOPLOT Controller, the Audio Module is not functional.

The Audinate Dante protocol does not support daisy-chaining. More information about networking with Dante-enabled devices can be found on Audinate's website: audinate.com/support/networks-and-switches

For more information on the HOLOPLOT Controller and on the different network configurations possible, please refer to its manual.



NETWORKING REQUIREMENTS

NETWORKING APPLIANCES

- A DHCP server needs to be present to provide all Audio Modules and HOLOPLOT Controller(s) with IP addresses. The HOLOPLOT System does not work with static IP addresses.
- To achieve full network redundancy, the network switches must be laid out in a redundant manner.
- Distribution switches should be located in close proximity to the Audio Modules, and cable length must not exceed 100 meters.
- All network switches must be compatible with the Audinate Dante networking technology.

NETWORK CONFIGURATION

- All HOLOPLOT devices must be networked in the same VLAN.
- In case of other devices on the same network, VLANs should be used in order to separate the traffic on layer 2 logically.

All HOLOPLOT devices in one VLAN/subnet form a single HOLOPLOT System. If you want to separate multiple systems (e.g. having a system for testing/ production and a system for operation), each system must be networked in its own VLAN/subnet.

Devices of different systems cannot live in the same VLAN/subnet of a network.

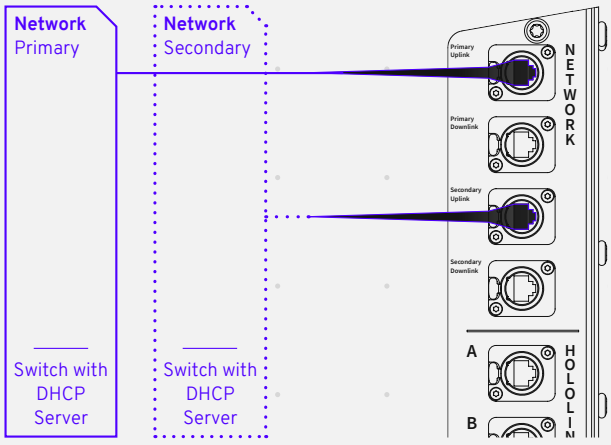
NETWORK CABLES

- Each HOLOPLOT Audio Module must be connected with at least one direct Gigabit copper-based network connection for configuration and maintenance.
- All copper cables must be Category 6 rated.
- All cables should be strain-relieved.
- For connectors and cable dress, there must be at least 100 mm clearance on the back of an Audio Module.

Color-coded cabling can be used to reduce uncertainty in maintenance.

NETWORK CABLE CONNECTIONS

Practically, one Ethernet line is run from each switch to an Audio Module, occupying two networking ports on the Audio Module: the primary switch connects to the Primary Uplink port and the secondary switch connects to the Secondary Uplink port.



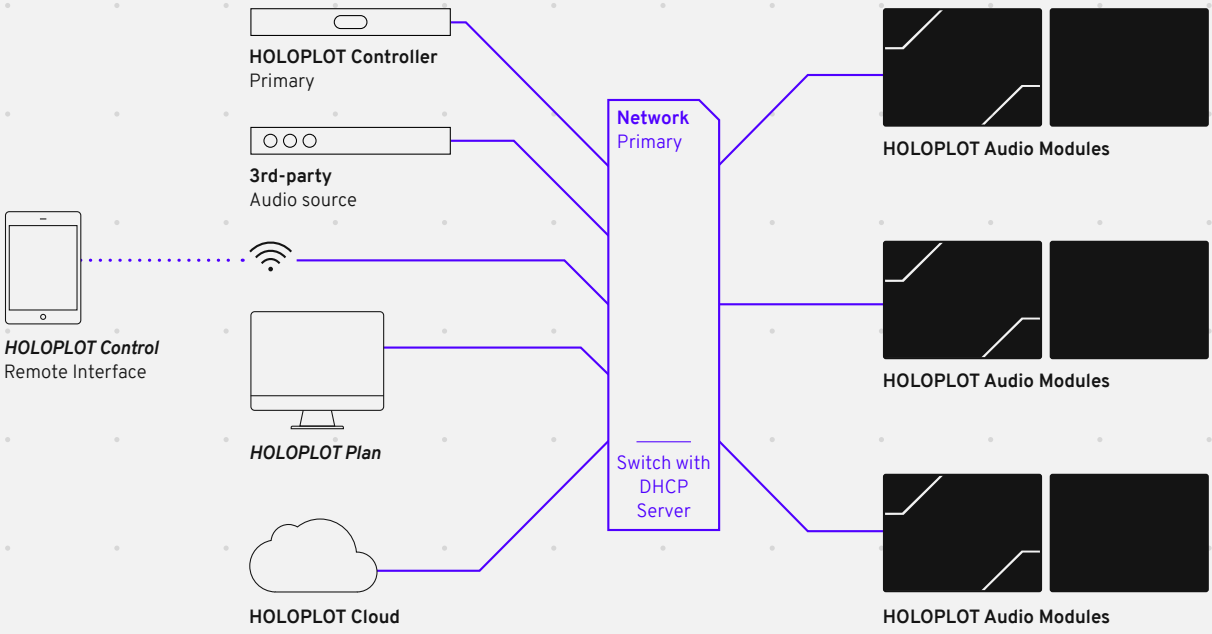
The maximum CAT6 cable length supported for control and Dante audio networking is 100 meters.

Operating the X1 Modul 96

MINIMUM SYSTEM SETUP REQUIRED

The minimum system setup for operating an individual Modul 96 is:

- HOLOPLOT Controller running the main system management service
- PC or Mac running *HOLOPLOT Plan*
- PC, Mac, or tablet running *HOLOPLOT Control*
- Third-party audio source with Dante audio networking connectivity
- Networking appliances: Ethernet switch and DHCP server



QUICK-START GUIDE: CONNECTING THE MD96 TO POWER AND NETWORK

In order to power on the MD96 correctly, follow the instructions below and respect the order.

STEP 1

CONNECTING THE MD96 TO AC POWER DISTRIBUTION

1. Connect the AC power cable to the blue AC Power IN connector of the Electronics Package.

2. Power the Audio Module by either connecting the AC power cable to the power distribution panel or by powering an already established power line to the Audio Module, e.g. by connecting a circuit breaker.

   When powering on the Audio Module, the following startup events take place over several seconds:

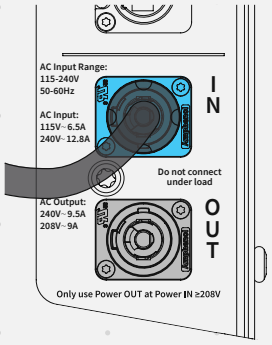
   a. When mains power is detected, the “POWER” LED on the Electronics Package’s Display panel turns green.

   b. Voltage is detected and the power supply mode is automatically adjusted.

   c. The power supplies ramp up.

   d. The Audio Module embedded operating system is booting.

   e. The screen on the Display Panel turns on and displays the Audio Module’s identifier string and firmware version.



Only switch on the main power source once all physical power connections are made.

If the “POWER” LED does not turn green, switch off the AC power source immediately and verify that the voltage is within the required range. If the problem persists, contact HOLOPLOT Customer Support.

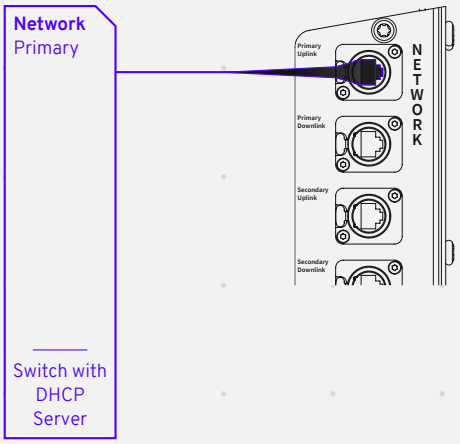
The “Status” LED on the Display Panel will indicate if an error is detected in the MD96 by turning red. The error description appears on the Display.

STEP 2

CONNECTING THE MD96 TO THE CONTROL & DANTE AUDIO NETWORK

In order to operate the Modul 96, the system must be set up following the Network Setup and Requirements.

The Audio Module needs to be connected to the network using its “Primary Uplink” connection. This enables connections to both Control and Dante Audio Network over a single network cable. To achieve full redundancy, connect a secondary network switch to its “Secondary Uplink”.



For more information on redundancy please refer to the Network Design section.

PLAYING BACK AUDIO ON THE MD96

After powering all devices, the following steps need to be carried out in order to play audio through the Modul 96:

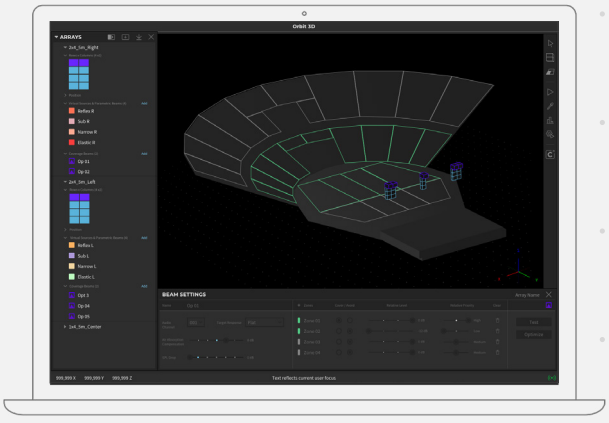
STEP 1

CONFIGURE THE MD96 VIA *HOLOPLOT PLAN*

a. Connect your PC / Mac to the local area network serving the HOLOPLOT Audio System.

b. In *HOLOPLOT Plan*, establish a connection to the HOLOPLOT Audio System.

c. Load your prepared project settings (including configurations for the MD96) onto the connected HOLOPLOT Audio System.



Once the pairing is successful, the Audio Module has received its position and sound field configuration data and is now ready to be routed to a Dante audio source.

STEP 2

CONNECT THE MD96 TO AN EXTERNAL AUDIO SOURCE VIA DANTE

Each X1 Audio Module is a Dante-enabled device fitted with its own Dante module. Therefore, channel- or object-based audio data is sent directly to each Audio Module via the Dante network protocol.

Use Audinate's Dante Controller to connect the third-party audio source's Dante sender channels to the sound fields' Dante receiver channels.

For detailed instructions on using the Dante Controller, including Multicast Transmit Flow configuration, please refer to the Dante Controller User Guide by Audinate.

In *HOLOPLOT Plan*, the user assigns sound fields to Dante receiver channels, which can then be mapped to Dante source channels using the Dante Controller. In order to simplify the channel mapping in *HOLOPLOT Plan*, you should always broadcast all Dante source channels to all Audio Modules in the system.

This means: For each Audio Module, connect Dante source channel 1 to Dante receiver channel 1, Dante source channel 2 to Dante receiver channel 2, etc. using the Dante Controller.

The number of unicast flows available in Dante is limited. Therefore, "Dante Multicast Transmit Flows" have to be established to transmit all audio source channels to all Audio Modules in the system.

The Audio Module supports Dante multicast flows with up to 16 channels per flow. Using multiple multicast flows, one X1 Audio Module can receive up to 200 audio input streams.

The Audio Module is now ready to play audio.

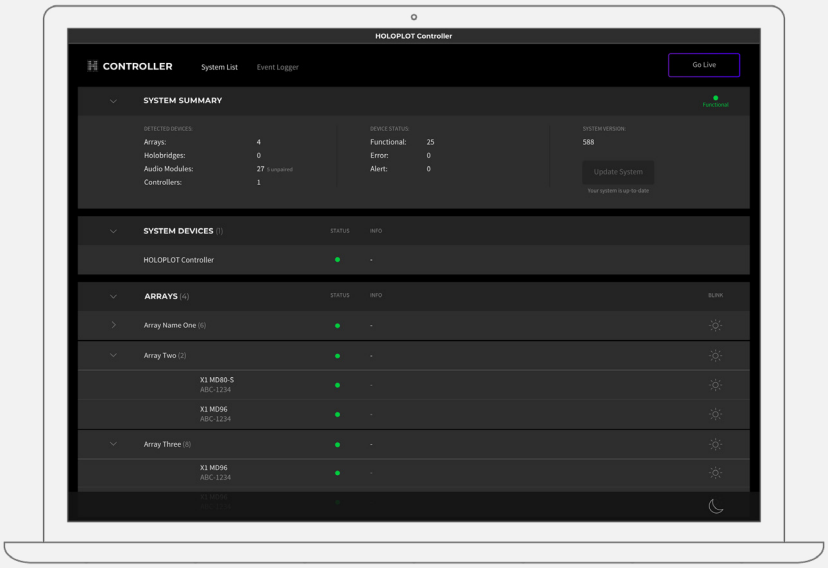
Exposure to high sound pressure levels can cause permanent hearing loss.

When playing audio for the first time, pay attention to the level of the incoming signal. Use the controls of the external audio source to set the level. We recommend you start at a relatively low level and increase slowly.

MONITORING AND CONTROLLING THE MD96 DURING OPERATION

HOLOPLOT Control, a browser-based interface, is used to manage, update, and monitor a HOLOPLOT Audio System installation.

You can access and use *HOLOPLOT Control* from a tablet device, using the internet browser.



ACCESSING *HOLOPLOT CONTROL*

There are two options to access *HOLOPLOT Control*:

- Enter https://holoplot.local/ in the address bar of your web browser.
- In *HOLOPLOT Plan*, once a connection to the HOLOPLOT Audio System has been established, follow *File* > *Open Controller Interface*. This will open the Web Interface in your default web browser.

Both options require an active connection to the local control network.

The HTTPS certificate on https://holoplot.local/ is a so-called self-signed certificate. The browser will display a warning about this, but it is safe to proceed.

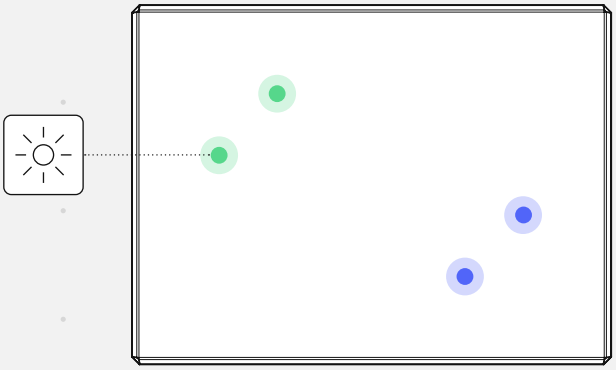
UPDATING

Software Updates for a HOLOPLOT Audio System are pushed via the cloud-based HOLOPLOT Connected Services to the HOLOPLOT Controller which distributes and facilitates the update for all HOLOPLOT devices within the local network. The update process is started by the user via *HOLOPLOT Control*. Once an update becomes available, click the “Update” button in the “System Summary” block. This starts an automated update process. The HOLOPLOT Controller will update itself, reboot, and eventually update the Audio Modules.

BLINKING

HOLOPLOT Control allows the user to light up the four LEDs located at the front of the Loudspeaker Cabinet. This allows for easy locating of Audio Modules within the venue.

To light up the LEDs, click the “Blink” icon ( ) next to an Audio Module or HOLOPLOT Matrix Array in *HOLOPLOT Control*.



TURNING OFF THE AUDIO MODULE

The Audio Module does not integrate a power switch. In order to safely power down the system, simply switch off the main power source the Audio Module is connected to.

The Amphenol HP Series 25 power connectors do not have breaking capacity. Therefore, do not connect or disconnect under load.

Service

HOLOPLOT Customer Suppport
Tel. (DE): +49 30 4074 5812
Tel. (USA): +1 747 333 5810
Email: help@holoplot.com

MAINTENANCE AND CARE

There are no user-serviceable parts inside the Audio Module. In case of any damage, contact HOLOPLOT Customer Support. Refer servicing only to qualified service personnel authorized by HOLOPLOT. In particular, if:

- objects or liquids have entered the device
- the device does not operate normally
- the device was dropped or the housing is damaged

Due to the cooling concept, no dust filters are required. As a result, filter exchange or cleaning is not necessary.

After a certain period of time, the Display Panel may require cleaning:

- Use a soft cloth only, and do not use any solvent cleaners.
- For cleaning very heavy dirt on the panel, it may be helpful to use a special cleaning spray for TFT screens. In this case, proceed as follows:

  a. Spray on the soft cloth before wiping the screen. Never apply/spray directly on the screen as the liquid could penetrate the device.

  b. Wipe the screen with moderate pressure.

HOLOPLOT CONNECTED SERVICES

A HOLOPLOT X1 Audio Module is a remote-accessible, updateable IoT device. This means that you have access to the following features:

- **Full system introspection:** Health and performance monitoring of system and components based on a multitude of in-device sensors
- **Remote monitoring & access:** Smart off-site system analysis and issue resolution, and remote system management (e.g. preset switching)
- **Over-the-air updates:** Improvements, security updates, and new features - making your system better over time
- **In sync with HOLOPLOT Cloud:** All system monitoring and configuration data is backed up for the lifetime of the installation

In addition, the HOLOPLOT service team or its affiliated partners will support you, by monitoring your system from remote via the HOLOPLOT Cloud to ensure maximum performance and minimum downtime.

Do not open the Electronics Package nor the Loudspeaker Cabinet. When damaged, do not operate the Audio Module under any circumstances.

X1 Modul 96 Data Sheet

CONFIGURATION:
TWO-LAYER MATRIX ARRANGEMENT

LF layer	18x 5-inch cone driver in individual dual-ported chambers
HF layer	78x 1.3-inch soft dome tweeter with integrated waveguides

MAXIMUM SPL
(for optimized parallel beam configuration[1])

LF layer	142 dB [2]
HF layer	152 dB [2]

FREQUENCY RESPONSE

±3 dB	100 - 18,000 Hz
-10 dB	85 - 20,000 Hz

BEAMFORMING CAPABILITIES: [3]
HOLOPLOT 3D AUDIO-BEAMFORMING TECHNOLOGY

Number of beams	Up to 12 beams in parallel per X1 Matrix Array: • 8 fully user-configurable parametric beams and virtual sources • 4 beams providing optimized coverage over a predefined audience area
Vertical	Steering angle and opening angle user adjustable (0.1° steps) / defined by HOLOPLOT algorithms
Horizontal	Steering angle and opening angle user adjustable (0.1° steps) / defined by HOLOPLOT algorithms

[1] Max. SPL capabilities are dependent on beam configuration and array size and should be assessed using *HOLOPLOT Plan*

[2] Peak level referred back to 1 m under free field conditions using band-limited pink noise with crest factor 4

[3] Beamforming capabilities are dependent on array size and should be assessed using *HOLOPLOT Plan*

AMPLIFICATION

Type	6x 16-channel digital amplifier modules
Max. Output Power [4]	HF: 78x 240 Wpk
	LF: 18x 500 Wpk

PROCESSING

Type	High-performance Field Programmable Gate Array (FPGA) computing the HOLOPLOT proprietary digital signal processing algorithms for 3D Audio-Beamforming and Wave Field Synthesis
	Dual-core ARM® Cortex™-A9 running HOLOPLOT OS, a Linux-based, distributed audio operating system
DSP Channels	96
Computation	7600 parametric EQ bands and more than 1100 Finite Impulse Response (FIR) filters with over 430000 filter taps

POWER CONSUMPTION

Sleep Mode	120 W
Idle	300 W
Continuous	650 W
Max Power	1,450 W

CONNECTORS ON ELECTRONICS PACKAGE

Control/Audio	4x etherCON Cat 6A (RJ45) for Control and Audio-over-IP (Dante™, AES67)
	2x etherCON Cat 6A (RJ45) for HoloLink
	2x etherCON Cat 6A (RJ45) for SubLink
Power	1x Amphenol HP-3-MDQ for AC Power IN (115 - 240 V AC, 50 - 60 Hz)
	1x Amphenol HP-3-MDGQ for AC Power OUT (208 - 240 V AC, 50 - 60 Hz)

[4] Peak power based on the maximum unclipped voltage the amplifier will produce into the nominal load impedance

PHYSICAL CHARACTERISTICS

Dimensions	800 mm x 600 mm x 457 mm (±2.5 mm)
Weight	100 kg

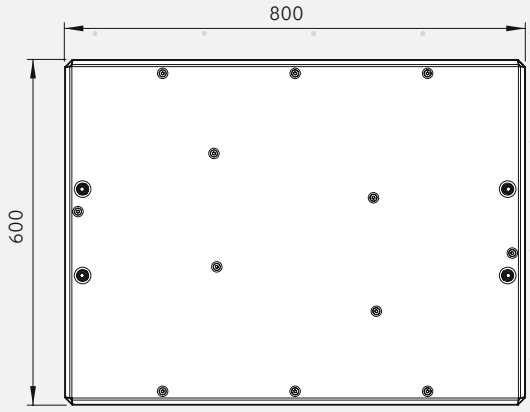
MATERIALS AND COLOURS

Loudspeaker Cabinet	Glass fiber-reinforced polycarbonate, flame retardant, slightly textured black finish (RAL 9005)
Electronics Package	Aluminum alloy, powder-coated black (RAL 9005)
Protective Grille	Hexagon-perforated steel with hydrophobic, damp and dust repellent acoustic cloth, black (RAL 9005)

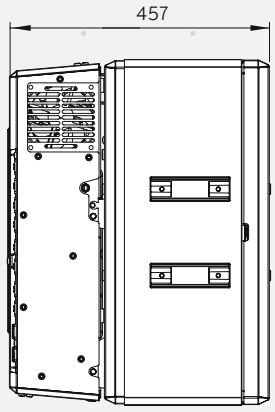
ENVIRONMENTAL CONDITIONS

Device Condition	Temperature	Humidity	Altitude
Packaged in shipping box	-20 °C to +60 °C	to 90% at +60 °C	to 12,000 m MSL
Operating	+10 °C to +45 °C	to 70% at +45° C (non-condensing)	to 2,000 m MSL

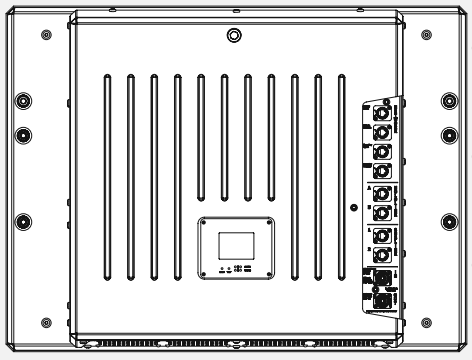
MECHANICAL DETAILS
All measurements given in mm



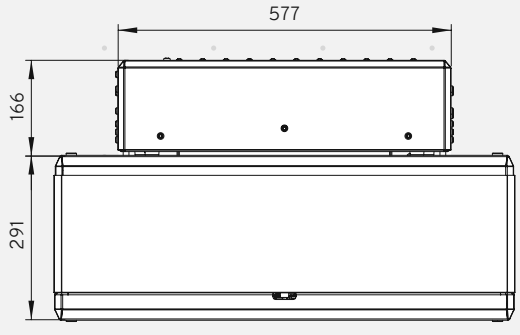
FRONT



SIDE



BACK



TOP

Manufacturer’s Declarations

WEEE DECLARATION
(DISPOSAL)

Electrical and electronic equipment must be disposed of separately from normal waste at the end of its operational lifetime. Please dispose of this product according to the respective national regulations or contractual agreements. If there are any further questions concerning the disposal, please contact HOLOPLOT.

EU DECLARATION OF CONFORMITY
(CE SYMBOL)

CE

Holoplot GmbH hereby declares that this product is in compliance with the requirements and relevant provisions of Directive 2014/53/EU and all other applicable EU directive requirements. A detailed declaration is available on request.

FCC STATEMENT OF CONFORMITY

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

INDUSTRY CANADA (IC) STATEMENT OF CONFORMITY

This Class A digital apparatus complies with Canadian ICES-003. / Avis de conformité à la réglementation D’industrie Canada: Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

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