RCF HDL 10-A Array Loudspeaker Modules User Manual

Contents

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SAFETY PRECAUTIONS

1. All the precautions, in particular the safety ones, must be read with special attention, as they provide important information.
   WARNING: to prevent the risk of fire or electric shock, never expose this product to rain or humidity.
2. POWER SUPPLY FROM MAINS
   - The mains voltage is sufficiently high to involve a risk of electrocution; install and connect this product before plugging it in.
   - Before powering up, make sure that all the connections have been made correctly and that the voltage of your mains corresponds to the voltage shown on the rating plate on the unit, if not, please contact your RCF dealer.
   - This unit is CLASS I construction, so it must be connected to a MAIN socket outlet with a protective earthing connection.
   - An appliance coupler or PowerCon Connector® is used to disconnect the device from MAIN power. This device shall remain readily accessible after the installation
   - Protect the power cable from damage; make sure it is positioned in a way that it cannot be stepped on or crushed by objects.
   - To prevent the risk of electric shock, never open this product: there are no parts inside that the user needs to access.
3. Make sure that no objects or liquids can get into this product, as this may cause a short circuit. This apparatus shall not be exposed to dripping or splashing. No objects filled with liquid, such as vases, shall be placed on this apparatus. No naked sources (such as lighted candles) should be placed on this apparatus.
4. Never attempt to carry out any operations, modifications, or repairs that are not expressly described in this manual. Contact your authorized service center or qualified personnel should any of the following occur:
   - The product does not function (or functions in an anomalous way).
   - The power cable has been damaged.
   - Objects or liquids have got in the unit.

- The product has been subject to a heavy impact.

5. If this product is not used for a long period, disconnect the power cable.
6. If this product begins emitting any strange odors or smoke, switch it off immediately and disconnect the power cable.
7. Do not connect this product to any equipment or accessories not foreseen. For suspended installation, only use the dedicated anchoring points, and do not try to hang this product by using elements that are unsuitable or not specific for this purpose. Also check the suitability of the support surface to which the product is anchored (wall, ceiling, structure, etc.), and the components used for attachment (screw anchors, screws, brackets not supplied by RCF, etc.), which must guarantee the security of the system/installation over time, also considering, for example, the mechanical vibrations normally generated by transducers. To prevent the risk of falling equipment, do not stack multiple units of this product unless this possibility is specified in the user manual.
8. RCF S.p.A. strongly recommends this product is only installed by professionally qualified installers (or specialized firms) who can ensure correct installation and certify it according to the regulations in force. The entire audio system must comply with the current standards and regulations regarding electrical systems.
9. Supports and trolleys The equipment should be only used on trolleys or supports, where necessary, that are recommended by the manufacturer. The equipment/support/trolley assembly must be moved with extreme caution. Sudden stops, excessive pushing force, and uneven floors may cause the assembly to overturn.
10. There are numerous mechanical and electrical factors to be considered when installing a professional audio system (in addition to those that are strictly acoustic, such as sound pressure, angles of coverage, frequency response, etc.).
11. Hearing loss Exposure to high sound levels can cause permanent hearing loss. The acoustic pressure level that leads to hearing loss is different from person to person and depends on the duration of exposure. To prevent potentially dangerous exposure to high levels of acoustic pressure, anyone who is exposed to these levels should use adequate protection devices. When a transducer capable of producing high sound levels is being used, it is therefore necessary to wear ear plugs or protective earphones. See the manual technical specifications to know the maximum sound pressure level.

IMPORTANT NOTES

To prevent the occurrence of noise on line signal cables, use screened cables only and avoid putting them close to:

- Equipment that produces high-intensity electromagnetic fields.
- Power cables.
- Loudspeaker lines.

The equipment considered in this manual can be used in electromagnetic environments E1 to E3 as specified on EN 55103-1/2: 2009. Place this product far from any heat sources and always ensure an adequate air circulation around it.

- Do not overload this product for a long time.
- Never force the control elements (keys, knobs, etc.).
- Do not use solvents, alcohol, benzene, or other volatile substances for cleaning the external parts of this product.

IMPORTANT NOTES

Before connecting and using this product, please read this instruction manual carefully and keep it on hand for future reference. The manual is to be considered an integral part of this product and must accompany it when it changes ownership as a reference for correct installation and use as well as for the safety precautions. RCF S.p.A. will not assume any responsibility for the incorrect installation and/or use of this product.
CAUTION: to prevent electric shock hazards, do not connect to the mains power supply while the grille is removed.

PRODUCT INFORMATION
The concept of this unique speaker derives from the touring industry, bringing in a compact cabinet all the experience of RCF professional sound. The vocals are natural, the sound is clear at longer distances, and the SPL power is stable at very high levels. The RCF Precision transducers equipping D LINE have been representing for decades the ultimate performance, the highest power handling, and the most advanced technology in the professional and touring industry. The high-power woofer delivers extremely accurate punchy bass and the custom-made compression driver offers a transparent midrange and extreme fidelity.

RCF Class-D power amplifier technology packs huge performance operating with high efficiency in a lightweight solution. D-LINE amplifiers deliver ultra-fast attack, realistic transient response, and impressive audio performance. The integrated DSP manages crossover, equalization, soft limiter, compressor, and dynamic bass boost. D LINE cabinets are molded on a special polypropylene composite material designed to dampen down vibrations even at maximum volume settings. From molding to the final texture, D LINE offers the maximum reliability and strength for intensive use on the road.

The HDL20-A and HDL10-A are very compact, self-powered, 2-way line array loudspeaker modules. The 700-watt Class-D amp modules accurately match the high-quality digital signal input boards with precise, complex filter responses that result in the natural, detailed reproduction of the best direct radiating designs. They are the ideal choice when line-array performance is needed but the venue size doesn’t call for the very long-throw characteristics of larger line-arrays and a fast and easy setup is a must. The speakers deliver extraordinary power handling, clarity, flexibility, and great sound in a compact, easy-to-handle, and affordable package.

THE INPUT SECTION PROVIDES

- Out XLR connectors;
- IN XLR Jack combo
- system volume control;
- 5 configuration switch;
- 4 status LEDs.

HDL20-A IS A 2-WAY ACTIVE SYSTEM FEATURING

- 10” neo woofer, 2,5” voice coil in horn loaded configuration;
- 2” exit, 3” voice coil neo compression driver;
- 100° x 15°, constant directivity coverage angle.

HDL10-A IS A 2-WAY ACTIVE SYSTEM FEATURING

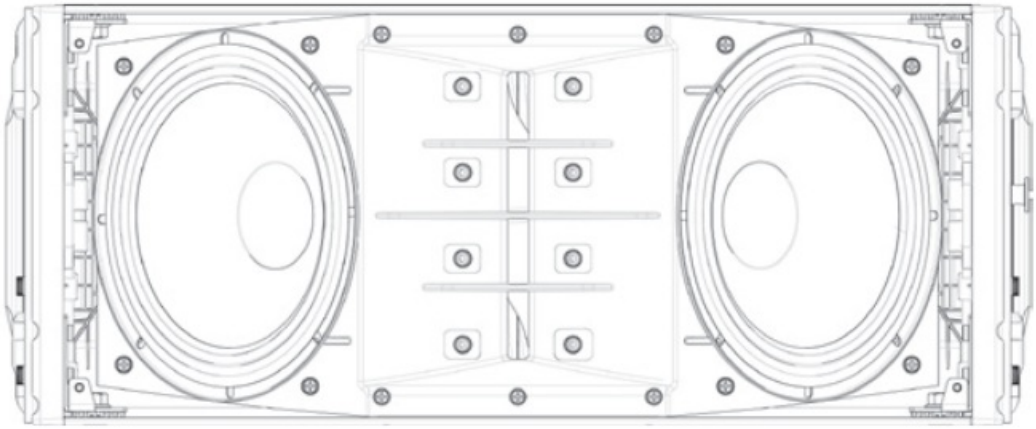
- 8” neo woofer, 2,0” voice coil in horn loaded configuration;
- 2” exit, 2,5” voice coil neo compression driver;
- 100° x 15°, constant directivity coverage angle.

THE AMPLIFIER SECTION FEATURES

- 700 Watt switching power supply module;
- 500 Watt low-frequency digital amplifier module;
- 200 Watt high-frequency digital amplifier module;
- extra capacitor bus able to sustain the voltage for 100 ms burst signals.

The total available power supply power is 700 watts and can be distributed to the 2 final amplifier sections. Each amplifier section has a very high maximum output power capability to provide, when necessary, maximum output bursts in a specific frequency range.

HDL20-A, HDL10-A ACTIVE LINE ARRAY MODULES



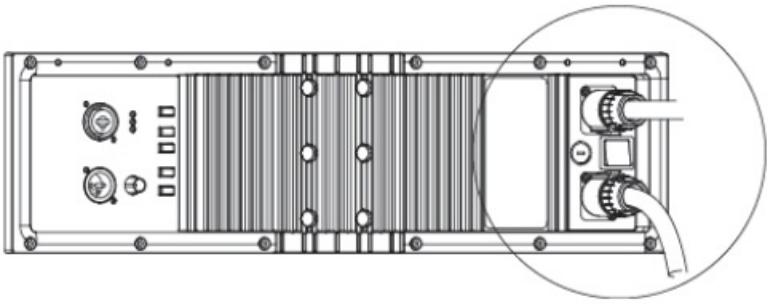
POWER REQUIREMENTS AND SET-UP

The HDL line array Systems are designed to operate in hostile and demanding situations. Nevertheless, it is important to take extreme care of the AC power supply and set up a proper power distribution. The HDL line array Systems are designed to be GROUNDED. Always use a grounded connection. The HDL amplifiers are designed to work within the following AC Voltage limits: 230 V NOMINAL VOLTAGE: minimum voltage 185 V, maximum voltage 260 V 115 V NOMINAL VOLTAGE: minimum voltage 95 V, maximum voltage 132 V. If the voltage goes below the minimum admitted voltage the system stops working If the voltage goes higher than the maximum admitted voltage the system can be seriously damaged. To obtain the best performance from the system the voltage must drop as low as possible.

Make sure that all the system is properly grounded. All the grounding points shall be connected to the same ground node. This will improve reducing hums in the audio system. The module is provided with a Powercon outlet to daisy chain other modules. The maximum number of modules that are possible to daisy chain is 16 (SIXTEEN) OR 4 HDL 18-AS + 8 HDL 20-A MAXIMUM OF 8 HDL18-A.

A superior number of modules in the daisy chain will exceed the Powercon connector’s maximum ratings and create a potentially dangerous situation. When the HDL line array systems are powered from a three-phase power distribution it is very important to keep a good balance in the load of each phase of the AC power. It is very important to include subwoofers and satellites in power distribution calculation: both subwoofers and satellites shall be distributed between the three phases.

AC CABLES DAISY CHAINS

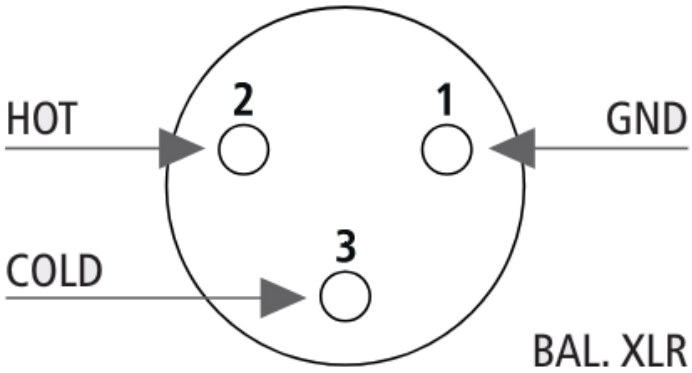


REAR PANEL

1. MAIN XLR INPUT (BAL/UNBAL). The system accepts male XLR/Jack input connectors with line-level signals from a mixing console or other signal source.
2. LINK XLR OUTPUT. The output XLR male connector provides a loop trough for speakers' daisy chaining.
3. VOLUME. Controls the volume of the power amplifier. The control ranges from – (maximum attenuation) to the MAX level ∞ (maximum output).
4. POWER INDICATOR. Power on indicator. When the power cord is connected and the power switch is turned on this indicator lights green.
5. SIGNAL INDICATOR. The signal indicator lights green if there is a signal present on the main XLR input.
6. LIMITER INDICATOR. The amplifier has a built-in limiter circuit to prevent clipping of the amplifiers or overdriving the transducers. When the peak clipping circuit is active the LED blinks orange. It is okay if the limit LED blinks occasionally. If the LED blinks frequently or lights continuously, turn down the signal level. The amplifier has a built-in RMS limiter. If the RMS limiter is active the LED lights red. The RMS limiter has the purpose of preventing damage to the transducers. The speaker shall never be used with the limit indicator red, continuous operation with the RMS protection active can cause damage to the speaker.
7. HF. The switch gives the possibility to set high-frequency correction depending on target distance (air absorption correction):
    - NEAR (used for pole mount applications or near field)
    - FAR (for farthest field).
8. CLUSTER. The combination of the 2 switches gives 4 possibilities of mid-low frequency correction depending on cluster size.
    - 2-3 modules (used for pole mount applications and ground stacking)
    - 4-6 modules (small flown systems)
    - 7-9 modules (medium flown systems)
    - 10-16 modules (maximum flown configuration).
9. HIGH CURVING. The switch gives the extra possibility to boost mid-frequencies depending on a high-curving cluster configuration of a few pieces.

- OFF (not active correction)
- ON (for high curving arrays of few pieces HDL20-A or HDL10-A).
- INDOOR. The switch gives the extra possibility to set low-frequency correction depending on indoor/outdoor use, to compensate for room reverberation on lows.
- OFF (not active correction) |
- ON (correction for reverberant indoor rooms).

10. AC POWERCON RECEPTACLE. RCF D LINE uses a POWERCON locking 3-pole AC mains. Always use the specific power cord provided in the package. AC POWERCON LINK RECEPTACLE. Use this receptacle to link one or more units. Always make sure that the maximum current requirement does not exceed the maximum admitted POWERCON current. In case of doubt call the closest RCF SERVICE CENTRE.
11. POWER MAIN SWITCH. The power switch turns the AC power ON and OFF. Make sure that the VOLUME is set to – when you turn on the speaker. FUSE.
    The XLR connectors use the following AES standard:
    - PIN 1 = GROUND (SHIELD)



    - PIN 2 = HOT (+)
    - PIN 3 = COLD (-)

CONNECTIONS

At this point, you can connect the power supply cable and the signal cable, but before turning on the speaker make sure that the volume control is at the minimum level (even on the mixer output). The mixer must be already ON before turning on the speaker. This will avoid damage to the speakers and noisy “bumps” due to turning on parts on the audio chain. It is a good practice to always turn on speakers at last and turn them off immediately after the show. Now you can turn ON the speaker and adjust the volume control to a proper level.
WARNING: Always make sure that the maximum current requirement does not exceed the maximum admitted POWERCON current. In case of doubt call the closest RCF SERVICE CENTRE.

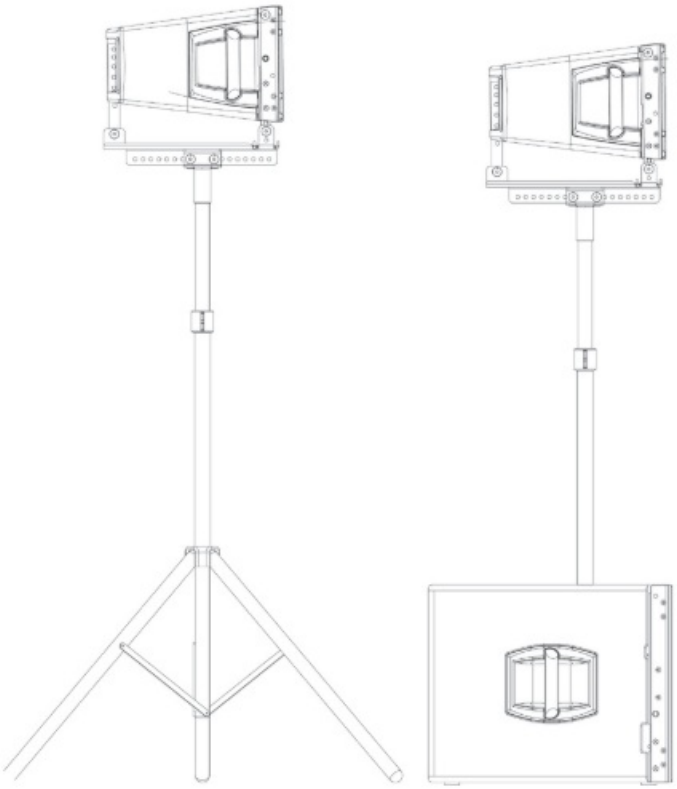
- 230 Volt, 50 Hz SETUP: FUSE VALUE T3,15A – 250V
- 115 Volt, 60 Hz SETUP: FUSE VALUE T6, 30A – 250V

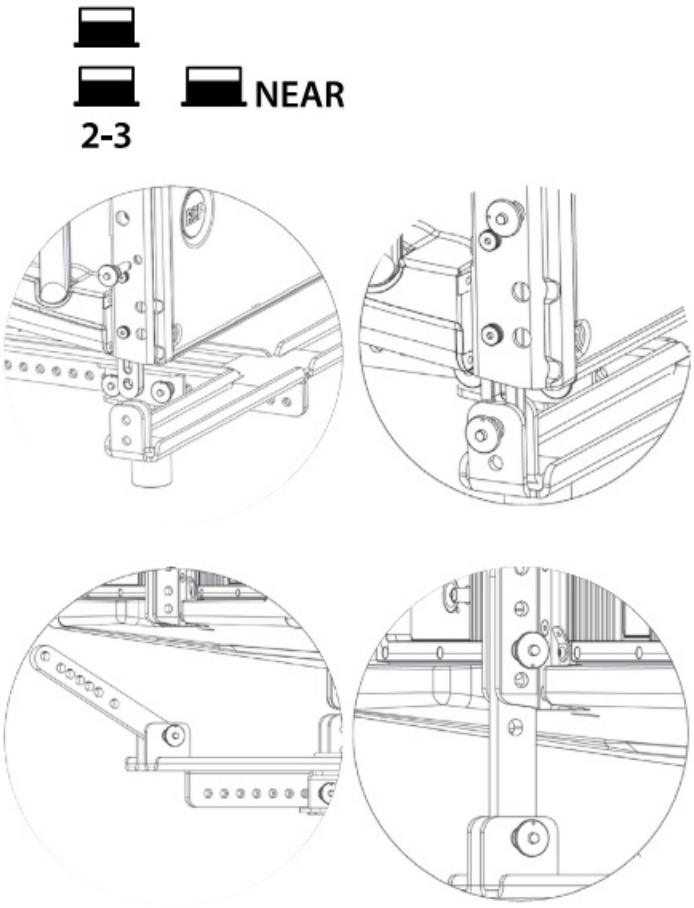
VOLTAGE SETUP (RESERVED FOR THE RCF SERVICE CENTRE)
The audio signal can be daisy-chained using the male XLR loop through connectors. A single audio source can drive multiple speaker modules (like a full left or right channel made of 8-16 speaker modules); make sure that the source device can drive the impedance load made of the module’s input circuits in parallel. The HDL line array input circuit presents a 100 KOhm input impedance. The total input impedance seen as a load from the audio source (ex. audio mixer) will be:

- system input impedance = 100 KOhm / number of input circuits in parallel.

- The required output impedance of the audio source (ex. audio mixer) will be:
- source output impedance > 10 system input impedance;
- always make sure that XLR cables used to feed audio signal to the system are:
- balanced audio cables;
- wired in phase.
- A single defective cable can affect the performance of the overall system!

POLE AND TRIPOD SAFETY





WARNINGS

The HDL is a flexible system that can be used in ground-supported or suspended applications. The following information will help you set up your HDL system safely and effectively. When using stands or poles, be sure to observe the following precautions:

- Check the stand or pole specification to be certain the device is designed to support the weight of the speaker. Observe all safety precautions specified by the manufacturer.
- Be certain that the surface on which the system is to be stacked is flat, stable, and solid.
- Inspect the stand (or pole and associated hardware) before each use and do not use equipment with worn, damaged, or missing parts.
- Do not attempt to place more than two HDL loudspeakers on a stand or pole.
- When mounting two HDL speakers on a pole or tripod, integral rigging hardware must be used to secure the speakers to each other.
- Always be cautious when deploying the system outdoors. Unexpected winds may topple a system. Avoid attaching banners or similar items to any part of a speaker system.
- Such attachments could act as a sail and topple the system. A single HDL may be used on a tripod stand (AC S260) or a pole (AC PMA) over its D
- LINE Series subwoofers. The use of a subwoofer is recommended for applications requiring more low-frequency power and extension and needs a pole (P.N. 13360110).

Usually, the cluster switch on the input panel should be set to the 2-3 position and the HF on NEAR when a single speaker is used. Indoor switch use depends on the speaker placement. Place the speaker on the pole or a tripod using its hardware LIGHT BAR HDL20-A (P.N. 13360229) or LIGHT BAR HDL10-A (P.N. 13360276) as shown in the following picture.

- Suspending loads should be done with extreme caution.
- When deploying a system always wear protective helmets and footwear.
- Never allow people to pass under the system during the installation process.
- Never leave the system unattended during the installation process.
- Never install the system over areas of public access.
- Never attach other loads to the array system.
- Never climb the system during or after the installation.
- Never expose the system to extra loads created by the wind or snow.
- WARNING: The system must be rigged by the laws and regulations of the Country where the system is used. It is the responsibility of the owner or rigger to make sure that the system is properly rigged by Country and local laws and regulations.
- WARNING: Always check that all the parts of the rigging system that are not provided by RCF are:
    - appropriate for the application;
    - approved, certified, and marked;
    - properly rated;
    - in perfect condition.
- WARNING: Each cabinet supports the full load of the part of the system below. Each single cabinet of the system must be properly checked.

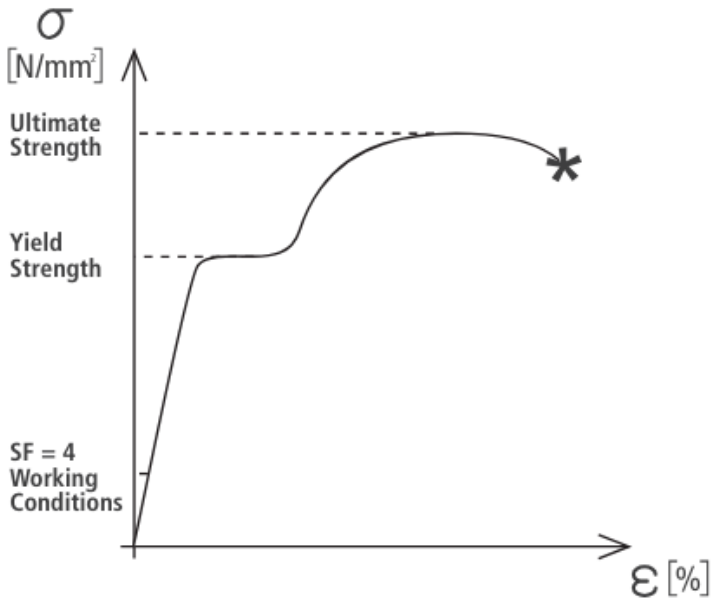
The suspension system is designed to have proper Safety Factors (configuration dependent). Using the “RCF Shape Designer” software it is very easy to understand safety factors and limits for each specific configuration. To better comprehend in which safety range the mechanics are working a simple introduction is needed: HDL mechanics are built with certified UNI EN 10025-95 S 235 JR and S 355 JR Steel. S 235 JR is structural steel and has a stress-strain (or equivalent Force-Deformation) curve like the following.

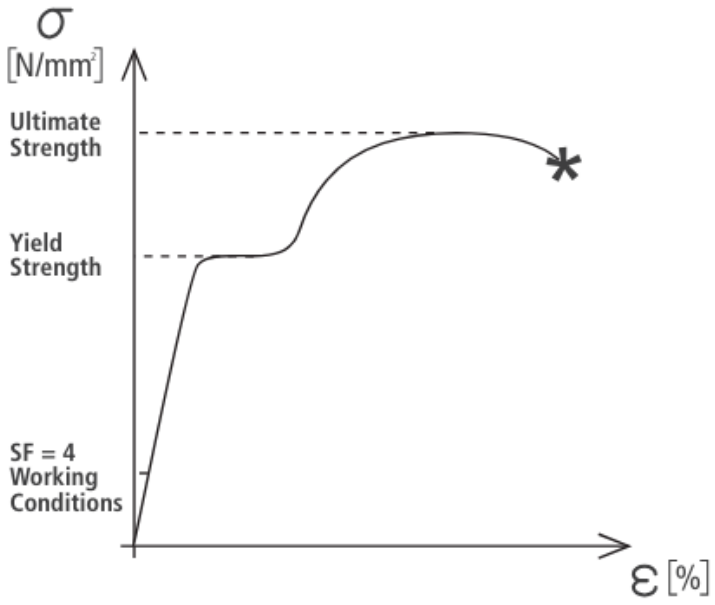
The curve is characterized by two critical points: the Break Point and the Yield Point. The tensile ultimate stress is simply the maximum stress attained. Ultimate tensile stress is commonly used as a criterion of the strength of the material for structural design, but it should be recognized that other strength properties may often be more important. One of these is for sure the Yield Strength. Stress-strain diagram of S 235 JR exhibits a sharp break at a stress below the ultimate strength. At this critical stress, the material elongates considerably with no apparent change in stress. The stress at which this occurs is referred to as the yield point.

Permanent deformation may be detrimental, and the industry adopted 0.2% plastic strain as an arbitrary limit that is considered acceptable by all regulatory agencies. For tension and compression, the corresponding stress at this offset strain is defined as the yield. S 355 J and S 235 JR characteristic values are R=360 [N/mm2] and R=510 [N/mm2] for Ultimate Strength and Rp0.2=235 [N/mm2] and Rp0.2=355 [N/mm2] for Yield Strength. In our prediction software, the Safety Factors are calculated considering the Maximum Stress Limit equal to the Yield Strength, according to many international standards and rules. The resulting Safety Factor is the minimum of all the calculated safety factors, for each link or pin. This is where you are working with a SF=4:

Depending on local safety regulations and on situation the required safety factor can vary. It is the responsibility of the owner or rigger to make sure that the system is properly rigged by Country and local laws and regulations. The “RCF Shape Designer” software gives detailed information on the safety factor for each specific configuration. The safety factor is the result of the forces acting on the fly bars and the system’s front and rear links and pins and depends on many variables: – number of cabinets;

RCF SHAPE DESIGNER” SOFTWARE AND SAFETY FACTOR





- fly bar angles
- angles from cabinets to cabinets. If one of the cited variables changes the safety factor

MUST BE recalculated using the software before rigging the system. In case the fly bar is picked up from 2 motors make sure that the fly bar angle is correct. An angle different from the angle used in the prediction software can be potentially dangerous. Never allow persons to stay or pass under the system during the installation process. When the fly bar is particularly tilted or the array is very curved the center of gravity can move out from the rear links. In this case, the front links are in compression and the rear links are supporting the total weight of the system plus the front compression. Always check very carefully with the “RCF Shape Designer” software for all these kinds of situations (even with a small number of cabinets).

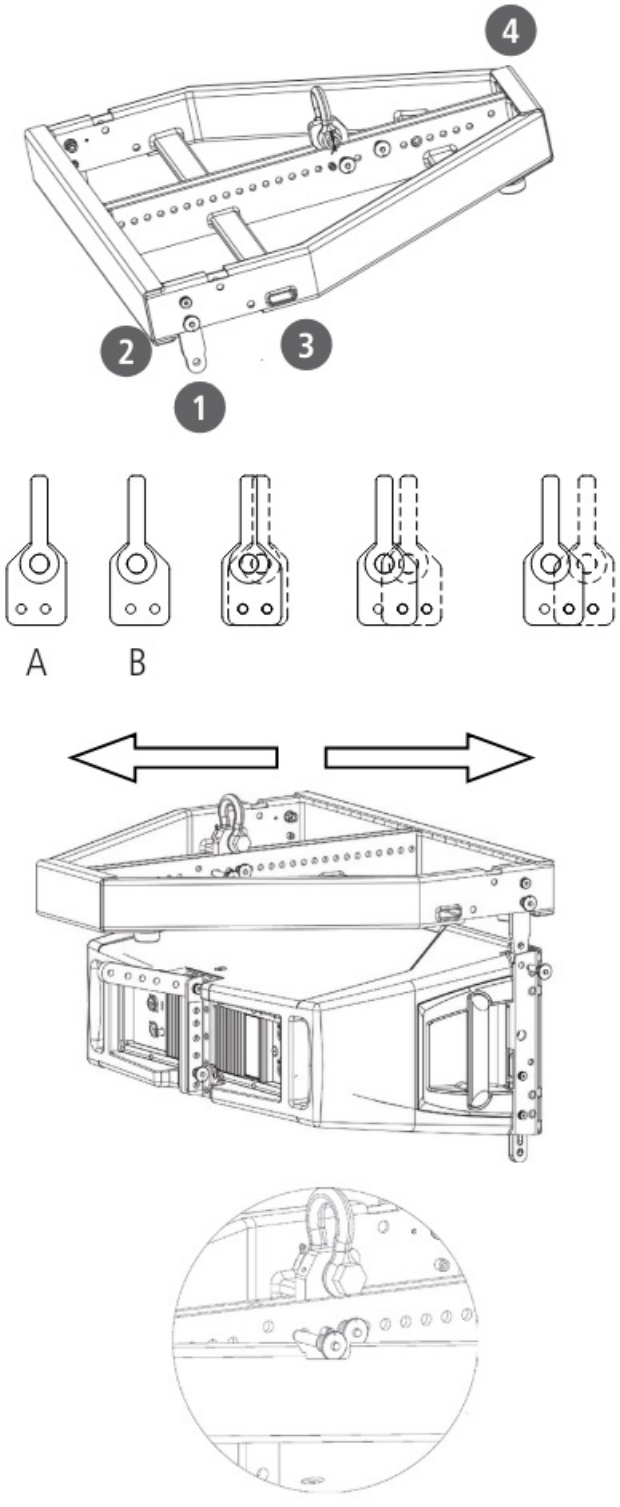
THE MAXIMUM NUMBER OF SPEAKERS THAT MAY BE SUSPENDED USING
THE HDL20-A FRAME IS:

- n° 16 HDL20-A;
- n° 8 HDL18-AS;
- n° 4 HDL 18-AS + 8 (EIGHT) HDL 20-A USING ACCESSORY LINK BAR HDL20-HDL18-AS

THE MAXIMUM NUMBER OF SPEAKERS THAT MAY BE SUSPENDED USING
THE HDL10-A FRAME IS:

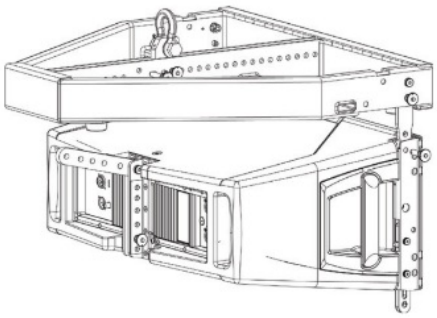
- n° 16 HDL10-A;
- n° 8 HDL15-AS;
- n° 4 HDL 15-AS + 8 (EIGHT) HDL 10-A USING ACCESSORY LINK BAR HDL10-HDL15-AS

THE HDL FLY BAR

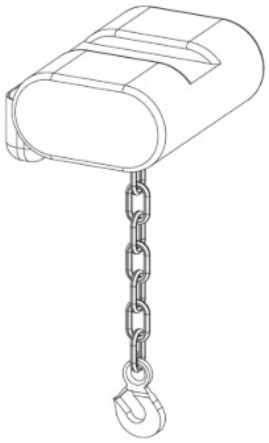


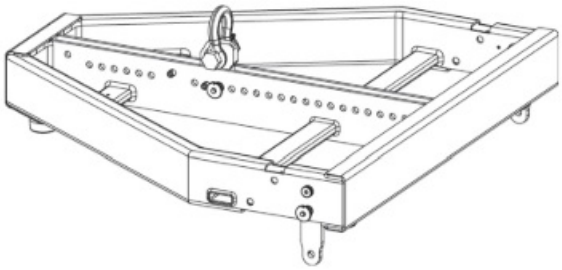
THE HDL FLY BAR FEATURES:

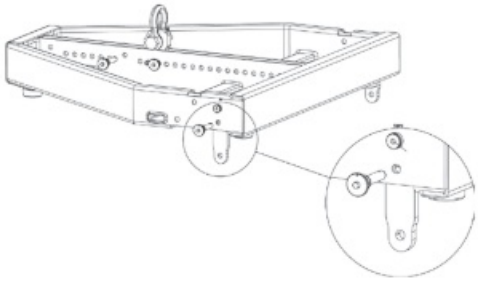
1. FRONT FLYING BRACKET. Front mounting.
   QUICK-LOCK PINHOLE. Front mounting (to be used to lock the front bracket before installation). FRONT BRACKET – TRANSPORT HOLES. CENTRAL PICKUP POINTS. The pickup point is asymmetric and can be fit in two positions (A and B).
   - A position brings the shackle towards the front.
   - B position allows an intermediate step using the same fixing holes.
   - Move the pickup bracket to the position suggested by the RCF Shape Designer.
   - Fix the pickup bracket with the two pins on the bracket's lanyard to lock the pickup
2. Check that all the pins are secured and locked.
   - Rigging the system follows the procedure:
   - RIGGING CHAIN HOIST.
   - CERTIFIED SHACKLE.

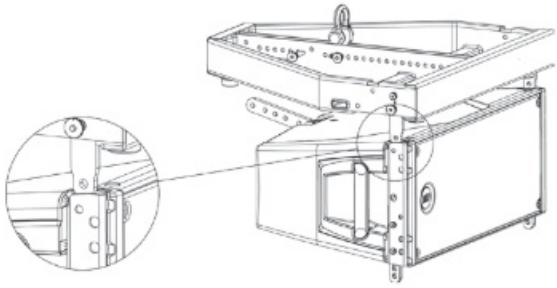


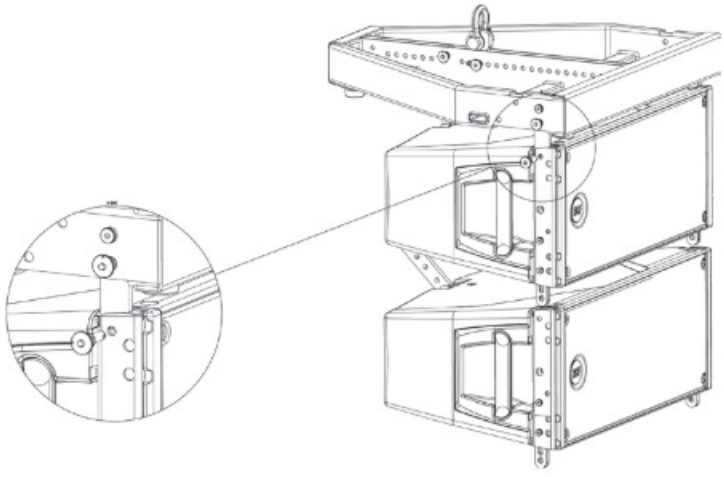
RIGGING PROCEDURE







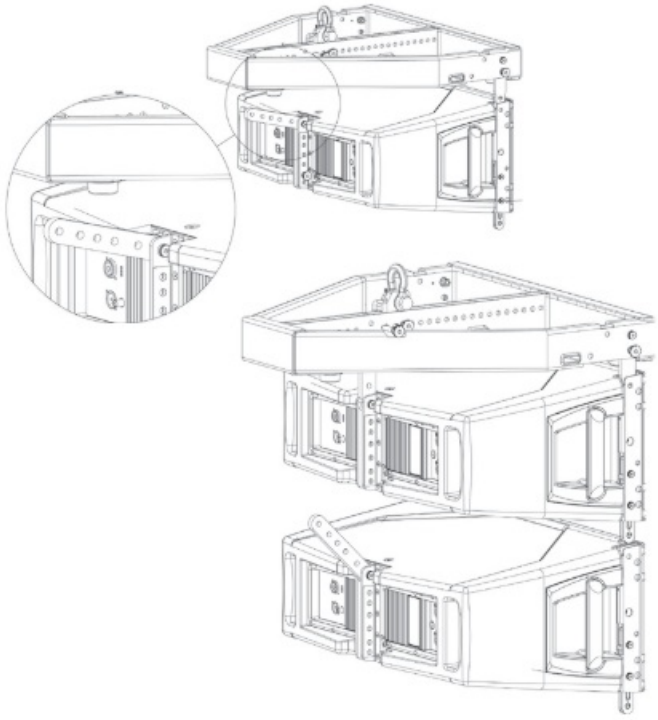


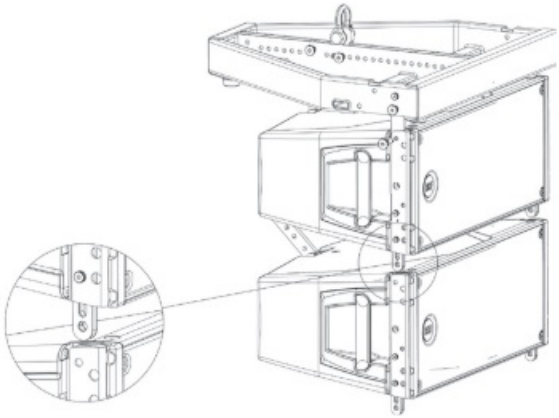


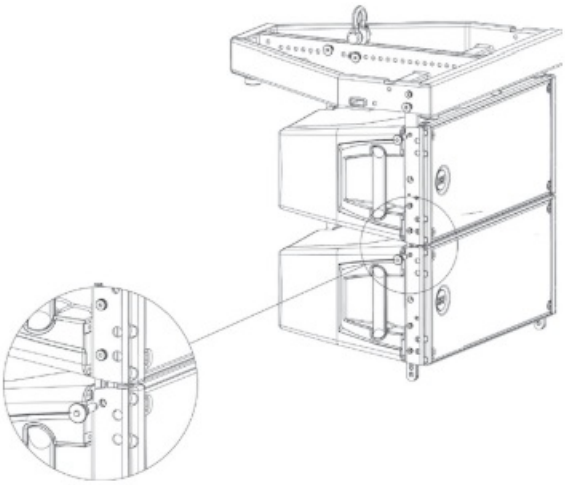
- FLY BAR.

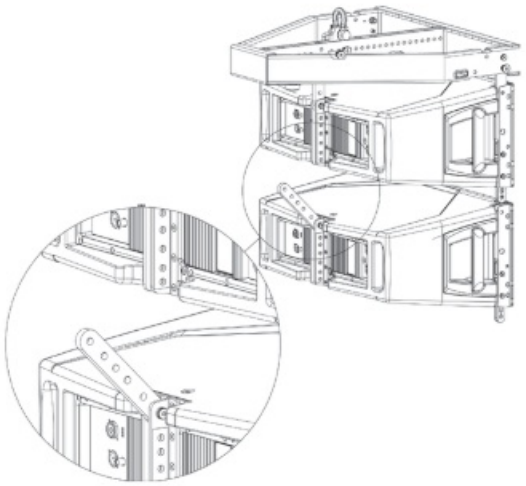
3. Connect the fly-bar F to the chain hoist H (o motors) using the certified shackle.
    - Secure the shackle.
    - Connect the second pin on the front bracket to make sure that the connecting brackets are vertical.
    - Connect the front bracket to the first HD cabinet using 2 quick lock pins.
    - USING THE FLY BAR HDL 20 LIGHT (P.N. 13360229) IT IS ALLOWED TO CONNECT A MAXIMUM OF 4 HDL 20-A MODULES.
    - USING THE FLY BAR HDL 10 LIGHT (P.N. 13360276) IT IS ALLOWED TO CONNECT A MAXIMUM OF 6 HDL 10-A MODULES.
4. Reverse and connect the 1 rear bracket to the fly-bar using 2 quick lock pins. The first HDL has to be fixed

always starting at 0° concerning the frame. No other angles are allowed.









5. Connect the second cabinet to the first always starting from the 2 front brackets.
6. Reverse and connect the rear bracket of the second cabinet using the hole for the proper angle.
7. Connect all the other cabinets following the same procedure and connecting a single cabinet each time

ARRAY SYSTEMS DESIGN

HDL allows users to choose from different face-to-face angle adjustments to create arrays with varying curvature. Thus, designers can create arrays custom-tailored to each venue's profile.
The basic approach to array design is dependent on three factors:

- Number of Array Elements;
- Vertical Splay Angles;
- Horizontal Coverage.

Determining the number of elements to use is critical: the number of elements greatly affects the SPL available from the system as well as the uniformity of coverage in both SPL and frequency response. The number of elements profoundly affects the directivity at lower frequencies. The next easy equation works as an approximation for flat listening planes. Coverage (x) ≈ 8n (m) Coverage distance required = x (meters). Changing the splay angles between cabinets has a significant impact on vertical coverage for the high frequencies, with the result that narrower vertical splay angles produce a higher Q vertical beamwidth, while wider splay lowers the Q at high frequencies. In general, the splay angles do not affect the vertical coverage at lower frequencies.

The curved array system design can be summarized as:

- flat-front HDL for long throw sections;

- increase curvature as distance decreases;
- add more enclosures for more output.

This approach focuses more transducers mounted on long-throw horns at the farthest seat, gradually focusing fewer transducers as distance decreases. As long as the no-gap rule is maintained, arrays constructed according to these principles will provide even SPL and a consistent sonic character throughout the venue without requiring complex processing. This approach, where the same amount of acoustic energy is spread over a larger or smaller vertical angle depending on the required throw, typically has the following objectives:

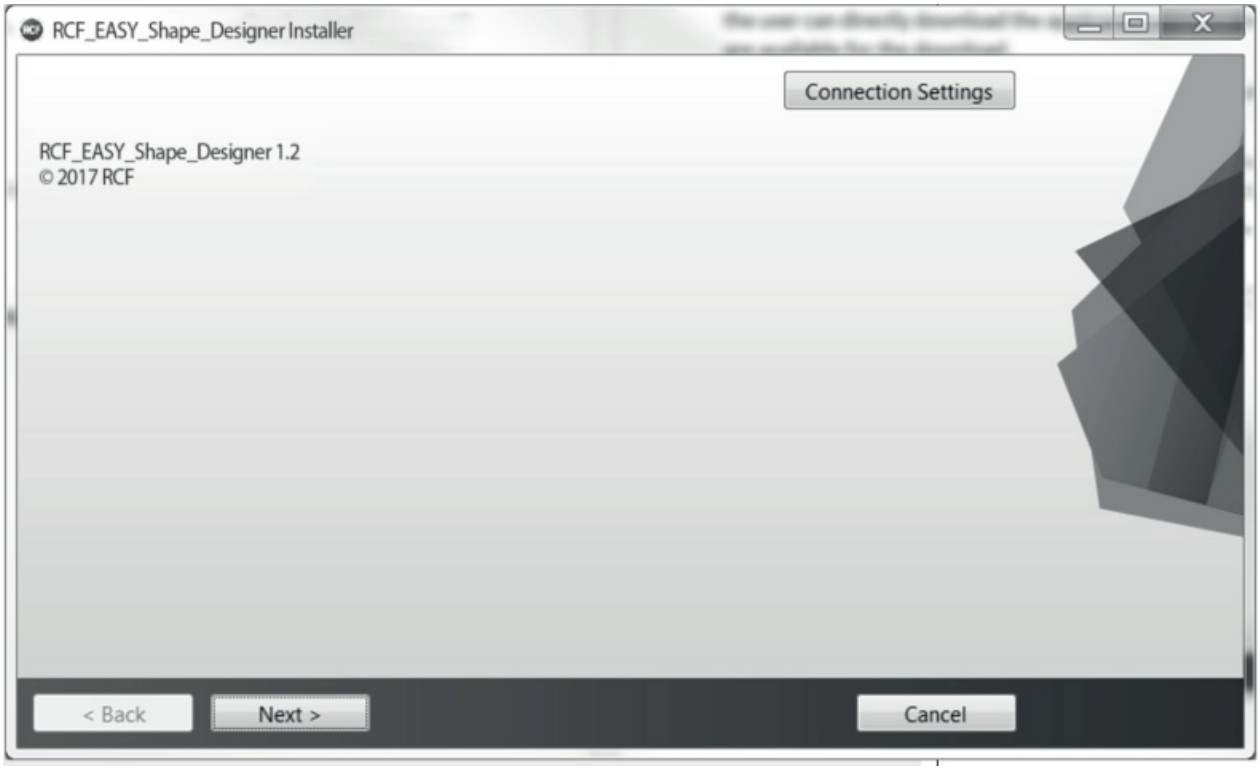
- even horizontal and vertical coverage;
- uniform SPL;
- uniform frequency response;
- sufficient SPL for the application.

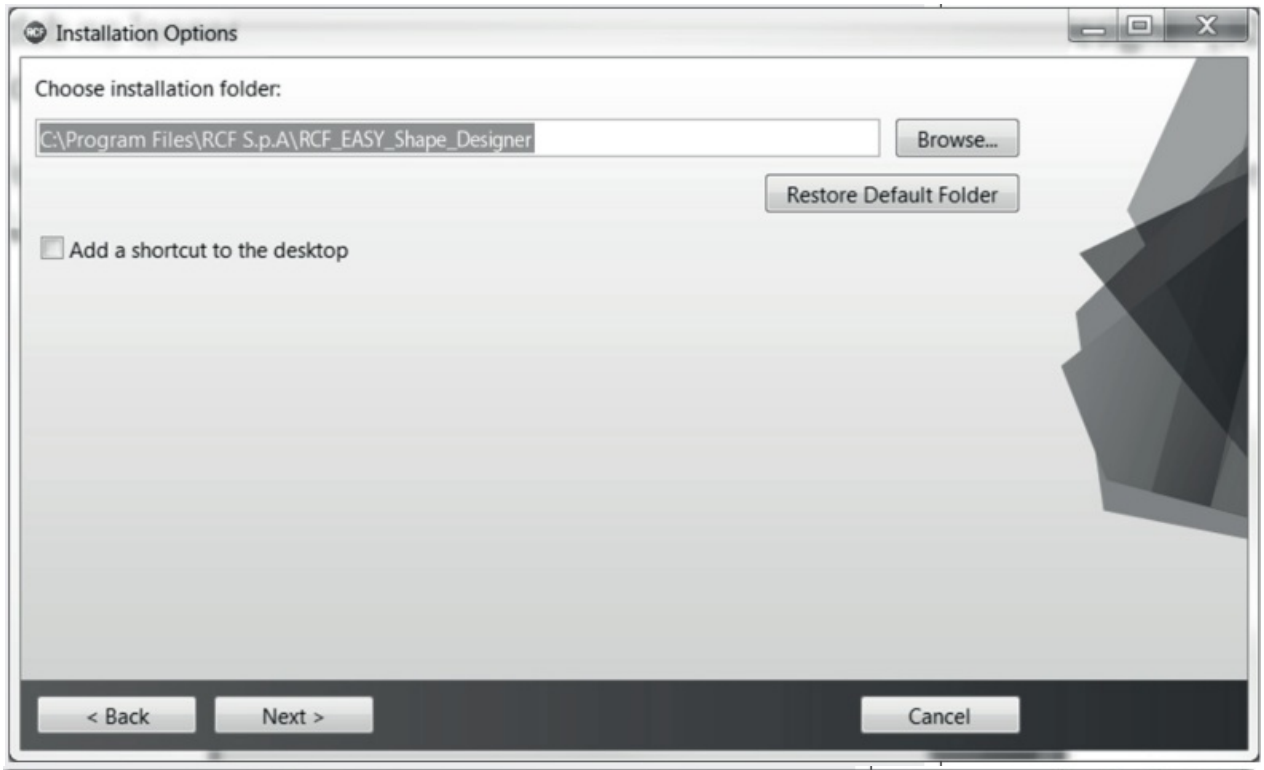
This discussion represents, of course, just a basic approach. Given the infinite variety of venues and performers, users will find themselves needing to solve specific problems in specific situations. RCF Shape Designer software is designed to help calculate optimum splay angles, aiming angles, and fly-bar pick points (crucial in aiming the array) for a given venue, which will be explained later in this Guide.

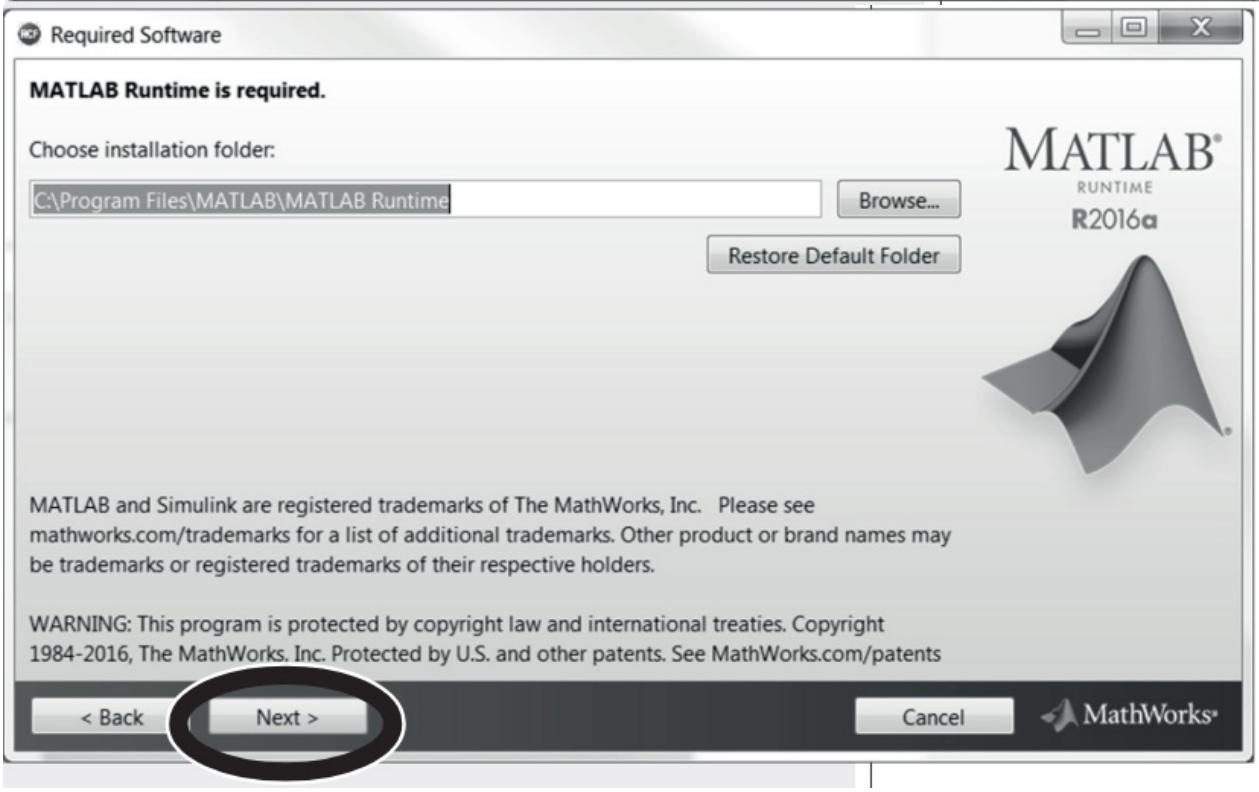
SOFTWARE EASY SHAPE DESIGNER

The software was developed with Matlab 2015b and requires Matlab programming libraries. At the very first installation user should refer to the installation package, available from the RCF website, containing the Matlab Runtime (ver. 9) or the installation package that will download the Runtime from the web. Once the libraries are correctly installed, for all the following versions of the software the user can directly download the application without the Runtime. Two versions, 32-bit, and 64-bit, are available for download.

IMPORTANT: Matlab no longer supports Windows XP and hence RCF Easy Shape Designer (32-bit) doesn't work with this OS version. You may wait a few seconds after double-clicking on the installer because the software checks if Matlab Libraries are available. After this step, the installation begins. Double-click the last installer (check for the last release in the download section of our website) and follow the next steps. After the choice of folders for RCF Easy Shape Designer software (Figure 2) and Matlab Libraries Runtime, the installer takes a couple of minutes for the installation procedure.




Installation Options
Choose installation folder:
C:\Program Files\RCF S.p.A\RCF_EASY_Shape_Designer
Browse...
Restore Default Folder
Add a shortcut to the desktop
< Back
Next >
Cancel


Required Software
MATLAB Runtime is required.
Choose installation folder:
C:\Program Files\MATLAB\MATLAB Runtime
Browse...
Restore Default Folder
MATLAB
RUNTIME
R2016a
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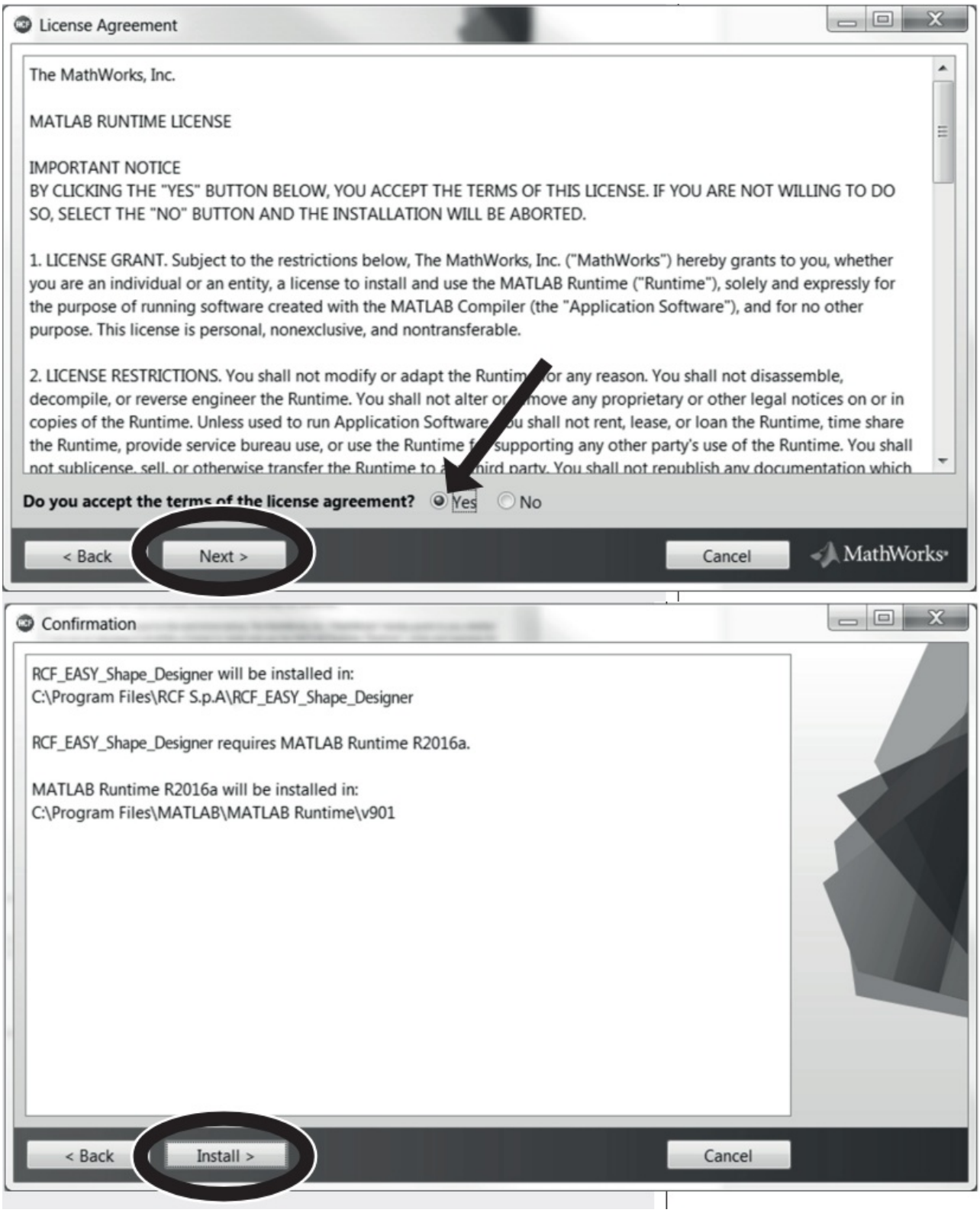
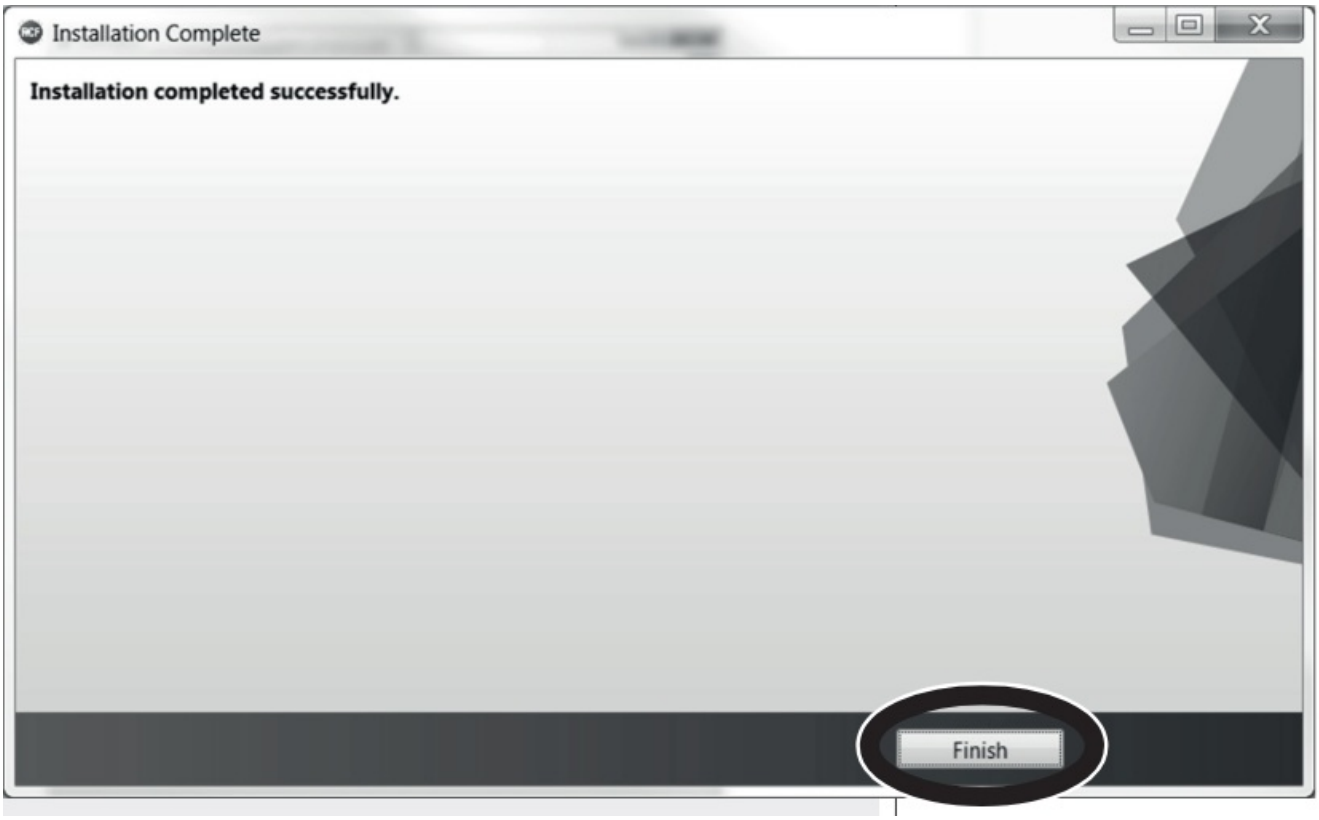
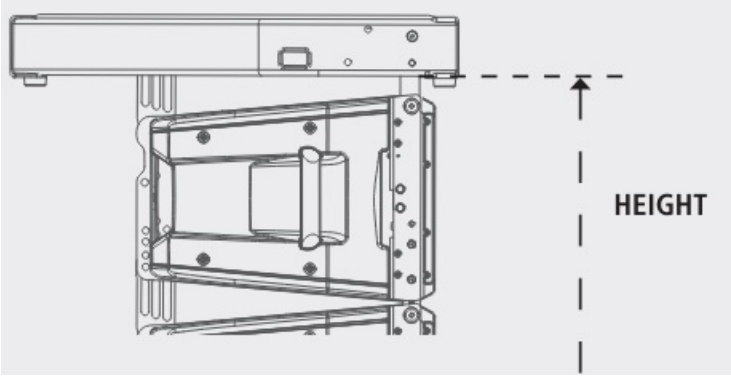


The RCF Easy Shape Designer software is divided into two macro sections: the left part of the interface is dedicated to project variables and data (size of audiences to cover height, number of modules, etc.), the right part shows the processing results. At first, the user should introduce the audience data choosing the proper pop-up menu depending on the size of the audience and introducing the geometrical data. It is also possible to define the height of the listener. The second step is the array definition selecting the number of cabinets in the array, the hanging height, the number of hanging points, and the kind of available flybars. When selecting two hanging points consider those points positioned at the flybar extremes. The height of the array should be referred to the bottom side of the fly bar, as shown in the picture below.

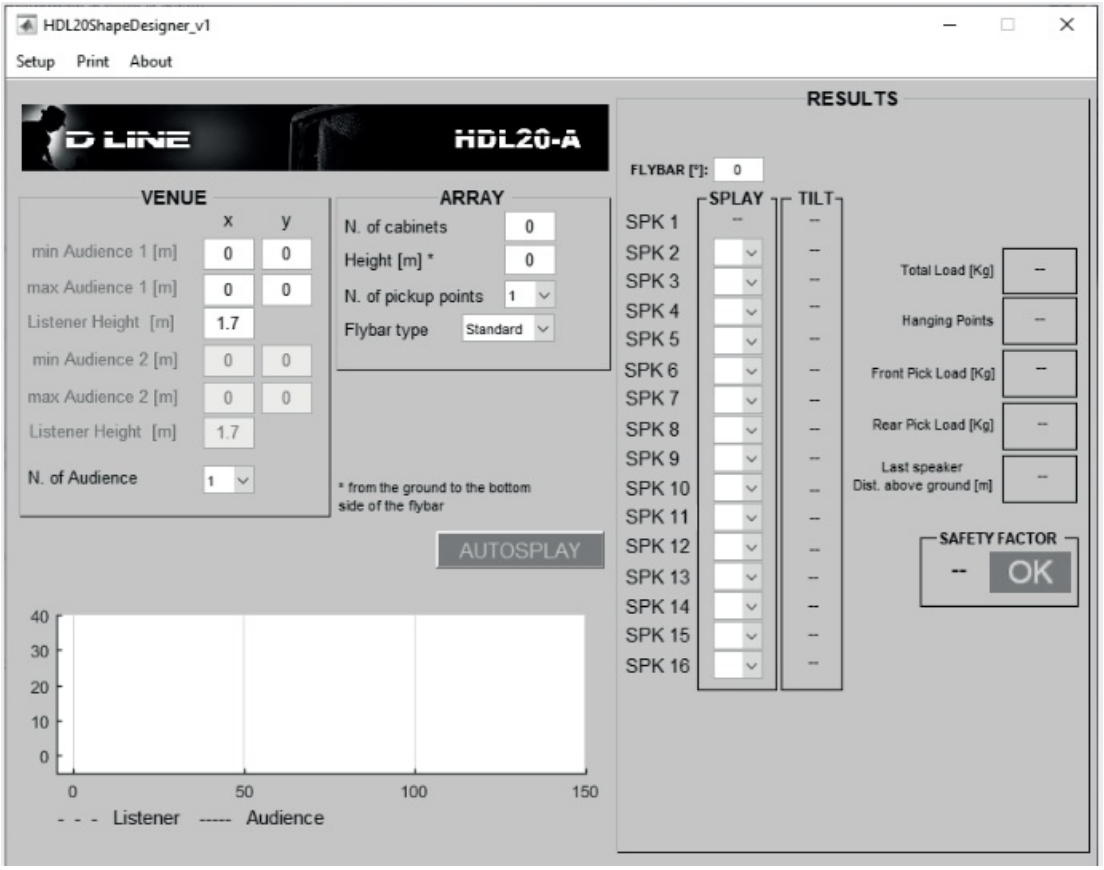
After entering all the data input in the left part of the user interface, by pressing the AUTOPLAY button the software will perform:



- The hanging point for the shackle with A or B position indicates if a single pickup point is selected, rear, and front load if two pickup points are selected.
- Flybar tilt angle and cabinet splays (angles that we have to set to each cabinet before lifting operations).



- The inclination that each cabinet will take (in case of one pick-up point) or will have to take if we were to tilt the cluster with the use of two engines. (two pick-up points).
- Total load and Safety Factor calculation: if the selected setup doesn't give safety Factor > 1.5 The text message shows in red color the failure to meet the minimum conditions of mechanical safety.
- Low-Frequency Presets (a single preset for all the array) for RDNet use or rear panel rotary knob use ("Local").

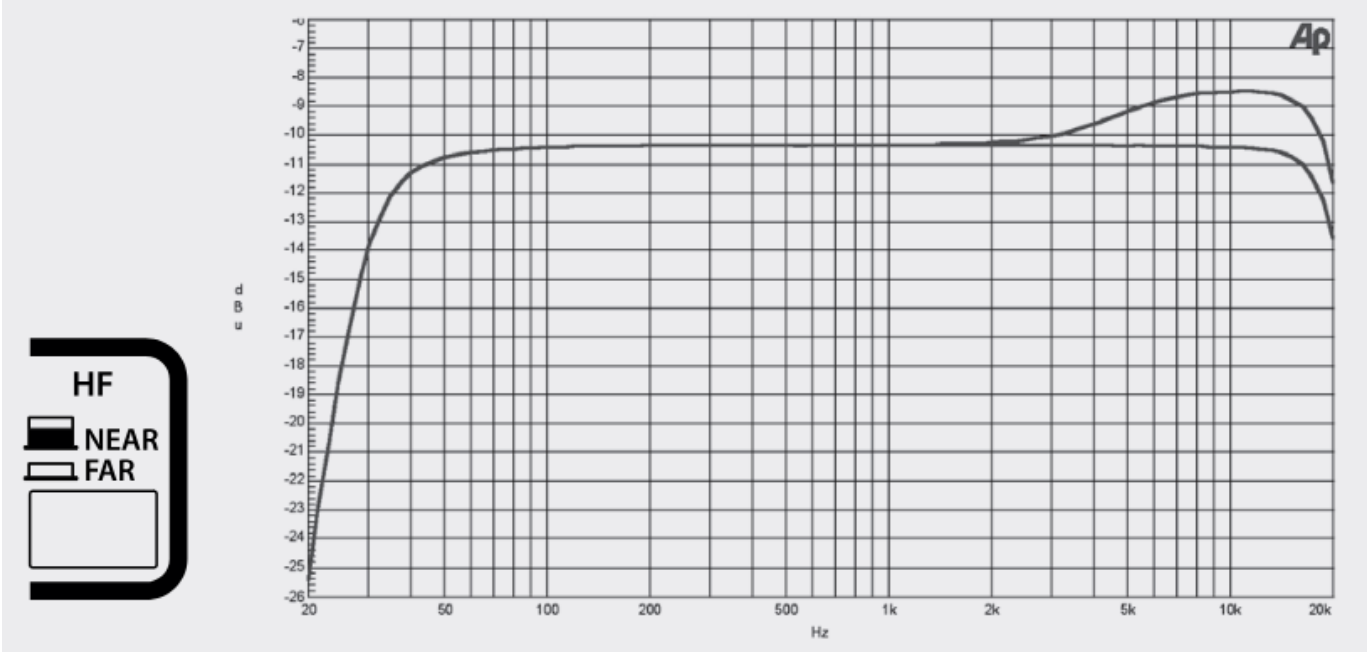


- High-Frequency Presets (a preset for every array module) for RDNet use or rear panel rotary knob use (“Local”).

OPTIMIZING THE ARRAY

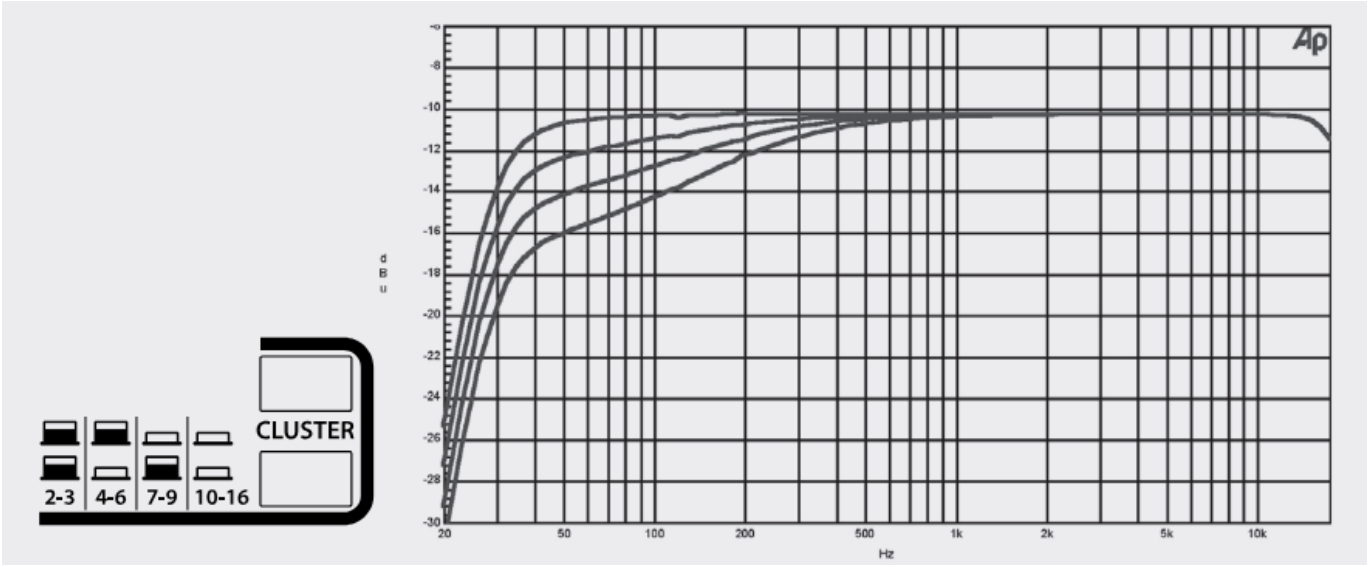
HIGH-FREQUENCY EQUALIZATION STRATEGIES

Once the design (number of elements and vertical splay angles) has been designed using Shape Designer software, you can effectively optimize the array depending on the environment and the application by driving it using different DSP presets stored onboard. Typically arrays are divided into two or three zones depending on the design and size of the array. To optimize and EQ the array, different strategies are used for high frequencies (long throws and short throws) and low frequencies. The longer the distance, the greater the attenuation at high frequencies. Generally, high frequencies need a correction to compensate for energy lost over a distance; the correction needed is usually proportional to the distance and high-frequency air absorption. In the near- to mid-field, the air absorption is not nearly as critical; in this zone, high frequencies need a little additional correction. The next figure shows the equalization that corresponds to HF settings for NEAR and FAR:

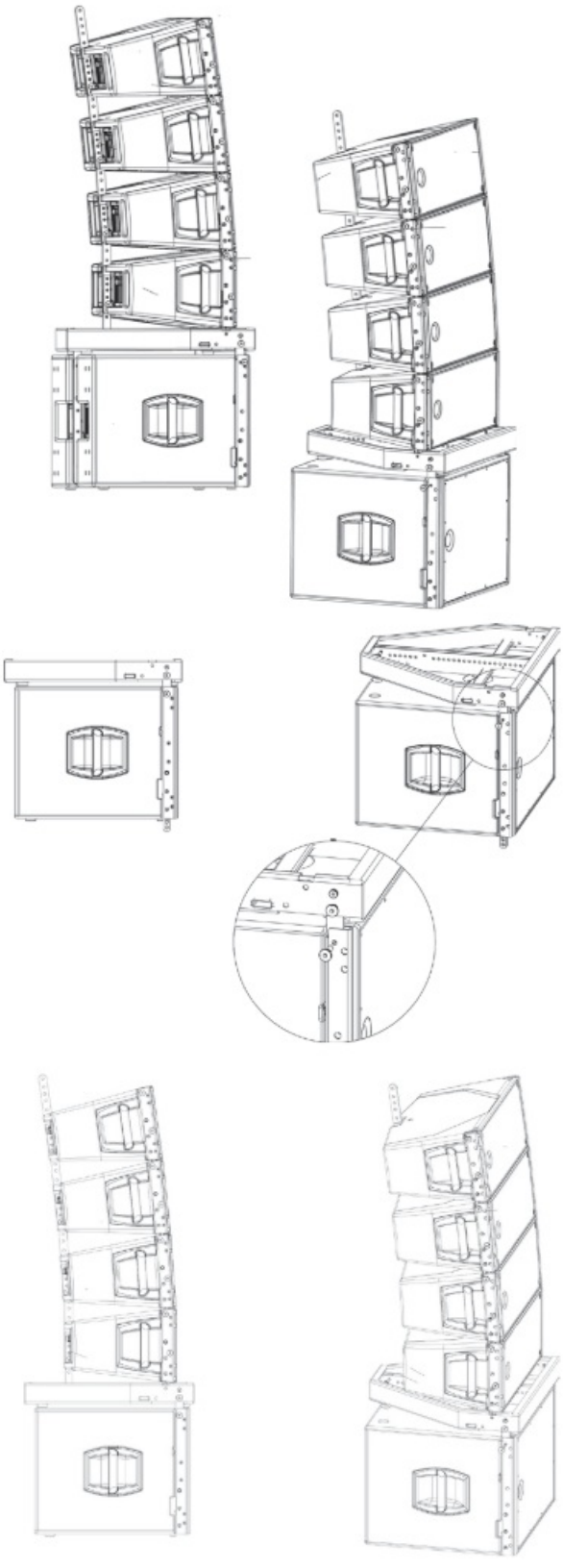


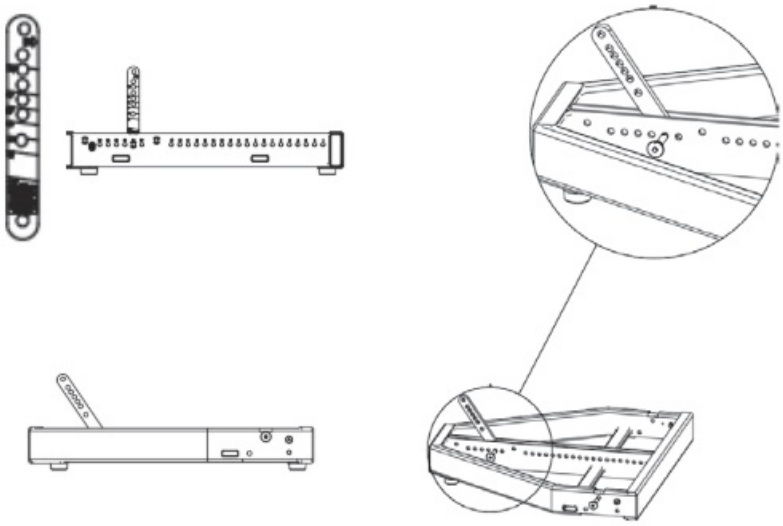
While wave guides provide isolated control over various mid- to high-frequency coverage areas, the low-frequency section of an HDL array still requires mutual coupling – with equal amplitude and phase – to achieve better directionality. Low-frequency directionality is less dependent on the array's relative splay angles and more dependent on the number of elements of the array. At low frequencies, the more elements in the array (the longer the array), the more directional the array becomes, providing more SPL in this range. The directional control of the array is achieved when the length of the array is similar to or larger than the wavelength of the frequencies being reproduced by the array.

Although the array can (and usually should) be zoned for implementing different equalization curves for high frequencies, identical equalization should be maintained in all the low-frequency filters. Different low-frequency equalization settings in the same array will degrade the desired coupling effect. For the same reason, gain differences are not recommended for line arrays, since adjusting various zones with an overall amplitude control for each results in a decrease in Low-frequency headroom and directionality. In any case, line arrays generally need a correction to compensate for energy sum on lows. The next figure shows the equalization that corresponds to CLUSTER settings, referring to different numbers of speakers from 2-3 up to 10-16. Increasing the number of cabinets, response curves are decreased to compensate for the low-frequency section mutual coupling.



HDL modules can still be stacked on top of RCF subwoofers using the HDL fly bar.
HDL 20-A compatible Subwoofers:

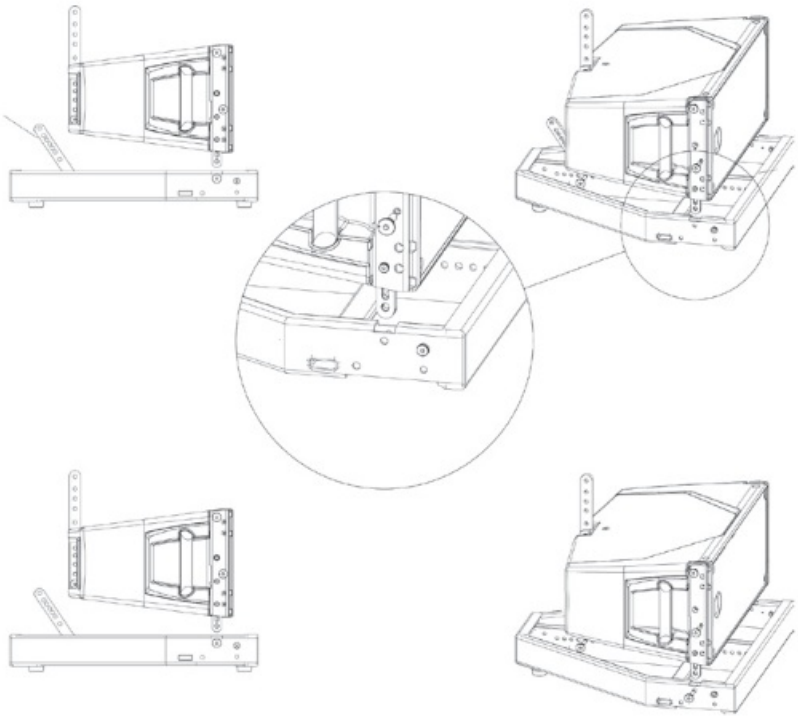


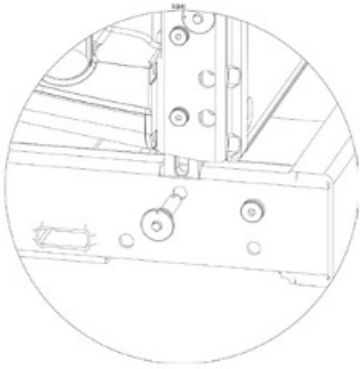


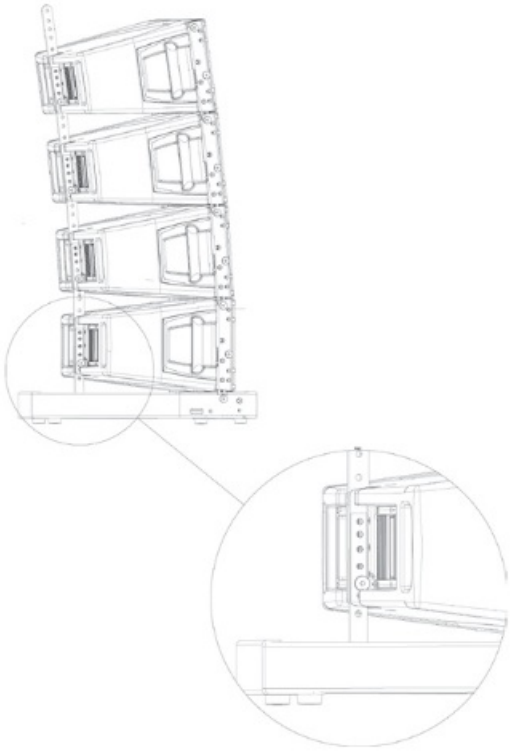
- SUB 8004-AS
- SUB 8006-AS
- HDL 18-AS

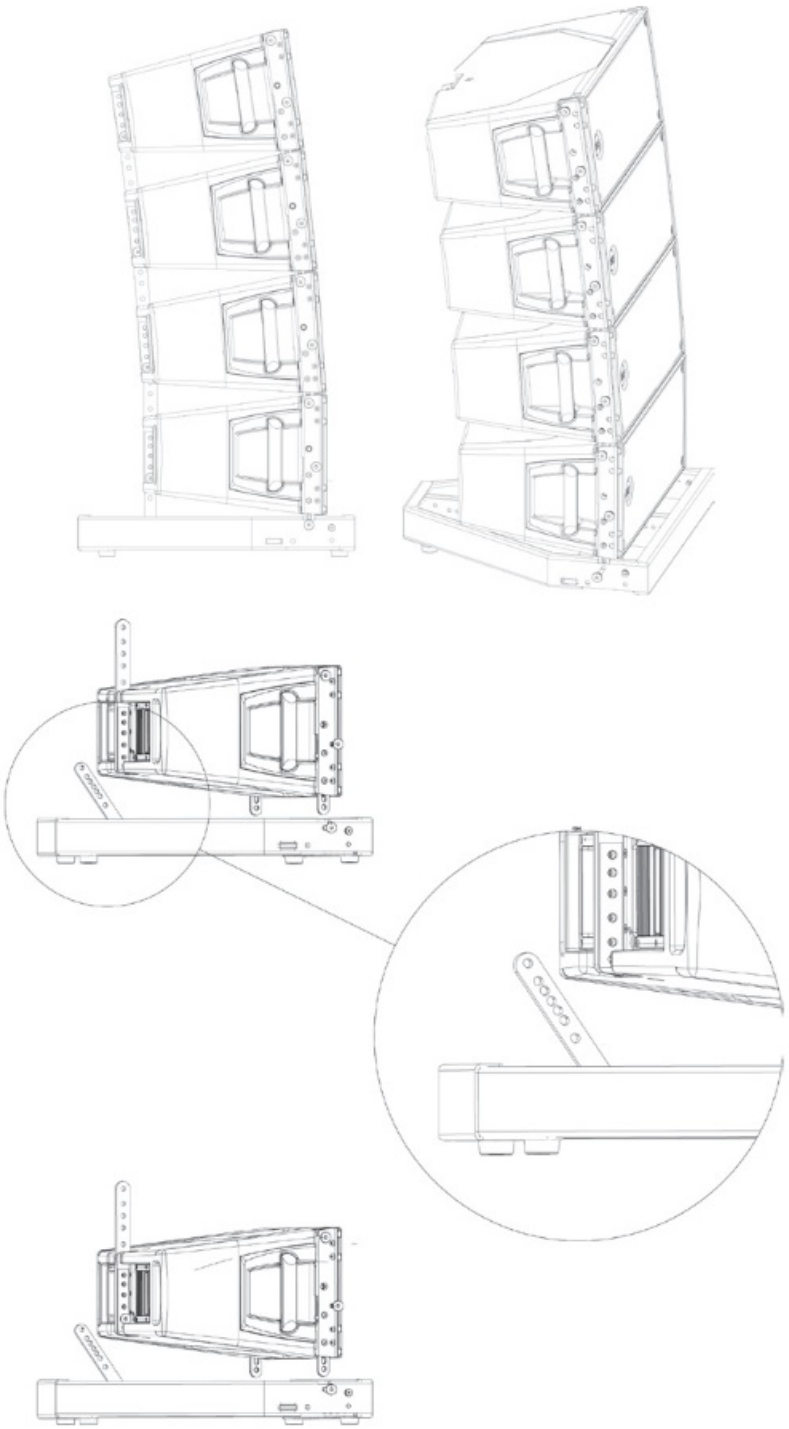
HDL 10-A compatible Subwoofers:

- SUB 8004-AS









- SUB 8006-AS
- HDL 15-AS
- HDL10-A & HDL20-A

GROUND STACKED

1. Fix the HDL fly bar on subs as shown in the picture.
2. The stacking bar adds a fixed amount of up or down tilt to ground-stacked HDL modules, with an additional 15 degrees of adjustment possible (from +7,5° to -7,5°).
3. Connect the front bracket of the first HDL cabinet using 2 quick lock pins.
4. The baffle of the bottom box in a stacked array does not necessarily have to be parallel to the stage or the array frame. It can be tilted up or downward if desired. In this way, arced arrays can be readily created from a ground

stack position.

5. The bottom box in a stacked array can be tilted to obtain proper coverage patterns (from +7,5 ° to -7,5°). Reverse and connect the 1 rear stacking bar bracket to the first enclosure using the hole for the proper angle and quick lock pins.
6. Add HDL cabinets one by one as indicated for flown configurations. Up to four HDL enclosures can be stacked and interlinked using the standard D-LINE rigging components and the D-LINE subs as ground support.
7. It is possible to stack HDL speakers on the ground using its fly bar as shown in the pictures.

SPECIFICATIONS

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Download PDF: RCF HDL 10-A Array Loudspeaker Modules User Manual

References

- User Manual

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