



GEO S12 Series

Geo S1210 & Geo S1230 Tangent Array Modules

LS18 & LS18e Subwoofer



User Manual

GEO Technology is radically new thinking

The GEO R&D Project has, to date, resulted in the following patent applications:

- The GEO Hyperboloid Reflective Wavesource™ differs radically from the megaphone-variant type horns you know and love (or hate). “Tried and true” methods will produce entirely unexpected results. HRW technology produces precise and predictable results.
- The Configurable Directivity Flange. A waveguide that allows the operator to alter its behaviour. An unprecedented NEXO development that is easy to use – once you know how and when.
- The Directivity Phase Device needs no operator input to function, but it is reassuring to know that the coupling of the midrange of the system is considered as important as the high frequencies...
- DSP-driven Directional Sub-bass devices are a new approach to controlling LF/VLF acoustic energy.

GEO is not hard to use when you understand how...

The technology behind GEO is revolutionary, but it is grounded in years of practical experience with the problems of delivering high quality professional sound to large audiences at high SPL levels. The GEO toolbox includes NS-1 - a simple yet powerful and highly predictive design tool. The array assembly system is keyed to the design software and will easily enable you to deploy your design with great precision. The NXAMP Amplified Digital TDcontroller provides driver protection and system optimization as well as DSP-driven cardioid pattern control for the LS and RS series Subwoofers.

GEO is a high precision system

The GEO HRW™ controls acoustic energy more precisely than other multiple element waveguides. It also makes GEO less forgiving of mistakes. Whilst conventional horns never combine into a coherent array, they may deliver acceptable results even if the design and deployment of the system is less than optimal. This is not the case with GEO where careless installation produces catastrophic results.

A GEO Tangent Array is not a “line array”

GEO Technology is equally effective in designing and deploying tangent horizontal arrays or curved vertical arrays. For best results in a specific application the user needs to know how multi-speaker arrays interact with audience geometry, along with the benefits and drawbacks of curved vertical arrays and horizontal arrays.

Curved tangent arrays require different design techniques

For the past 20 years, sound reinforcement professionals have worked with horizontal arrays that use conventional horns to deliver [more or less] ‘equal power to equal *angles*’. Curved vertical arrays are designed to deliver [more or less] equal power to equal *areas*’. When arrays use conventional horns, the lack of precision, overlap and interference masks errors in array design and aiming. The highly precise GEO wavesource responds accurately, consistently and predictably to the design and deployment of a curved vertical tangent array. This is why the GEO rigging system is designed to control angular splay to 0.01° precision.

GEO curved tangent arrays require different operational techniques

Over the years, system designers and operators have developed a number of signal processing techniques to disguise and partly overcome the limitations of horn design. “Frequency shading,” “amplitude shading,” “system tuning,” all of these are tools of the advanced sound system operator. **NONE OF THESE TECHNIQUES ARE APPLICABLE TO GEO TANGENT ARRAYS.** Instead of enhancing the array’s performance they will severely degrade it.

Take time to learn how to get great results with GEO Technology. It is an investment that will pay off in more satisfied clients, more efficient operating procedures and more recognition for your skill as a sound system designer and operator. A comprehensive understanding of GEO theory, tangent arrays, and specific features of the GEO S12 Series will help you to operate your system at its full potential.

PLEASE READ CAREFULLY BEFORE PROCEEDING**BASIC PRECAUTIONS**

Do not open the speaker system or attempt to disassemble the internal parts or modify them in any way. The speaker system contains no user-serviceable parts. If it should appear to be malfunctioning or damaged, discontinue use immediately and have it inspected by qualified NEXO service personnel.

Water exposure: Do not expose the speaker system to direct rain, do not use it near water or in wet conditions. Do not place containers with liquid on speaker system as they might spill into openings. If any liquid such as water seeps into the speaker system, have it inspected by qualified NEXO personnel.

SYSTEM DEPLOYMENT SAFETY RULES

Read User Manual before deployment. Before use of enclosed speaker system, please ensure that anyone involved in system deployment understands the rigging – stacking – pole mounting safety rules as described in the speaker system User Manual. Failure to do this exposes people to potential injury or death.

Always consult qualified NEXO personnel if the device installation requires construction work and make sure to observe the following precautions:

Mounting precautions

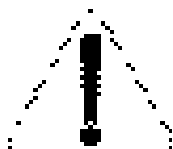
- choose mounting hardware and an installation location that can support the weight of the speaker system;
- do not use speaker system handles for suspended installation;
- do not expose speaker system to excessive dust or vibration, or extreme cold or heat to prevent possibility of component damage;
- do not place the speaker system in an unstable position from which it might fall accidentally;
- if speaker systems uses a stand, ensure that stand specifications are adapted, and that stand height does not exceed 1.40m/55"; never move the stand while the speaker is in position.

Connection and powering precautions

- remove all connected cables before moving the speaker system;
- turn off AC power of all power amplifier units before connecting the speaker system;
- when turning on the AC power to the audio system, always turn on the power amplifier last; when turning the AC power off, always turn off the power amplifier first;
- when used in cold conditions, a gradual power ramp up should be applied to the system on a 5 mn period to allow the loudspeaker components to stabilize during the very first minutes of usage.

Inspect the speaker system periodically.

SAFETY INSTRUCTIONS FOR NEXO TD CONTROLLERS



NEXO ANALOGUE PSTDCONTROLLERS, NX242 DIGITAL CONTROLLER, NXAMP4x1 AND NXAMP4x4 POWERED CONTROLLERS ARE CLASS 1 APPARATUS AND MUST BE EARTHED.

THE GREEN AND YELLOW WIRE OF THE MAINS CORD MUST ALWAYS BE CONNECTED TO AN INSTALLATION SAFETY EARTH OR GROUND. THE EARTH IS ESSENTIAL FOR PERSONAL SAFETY AS WELL AS THE CORRECT OPERATION OF THE SYSTEM, AND IS INTERNALLY CONNECTED TO ALL EXPOSED METAL SURFACES.

- Read these instructions.
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water.
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet. (US market)
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer.
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

The lightning flash with arrowhead symbol, within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

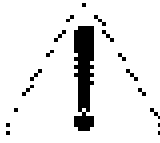
CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

WARNING: To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

To avoid electrical shock, do not remove covers.
Dangerous voltages exist inside.
Refer all servicing to qualified personnel only.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

HIGH SOUND PRESSURE LEVELS



Exposure to extremely high noise levels may cause permanent hearing loss. Individuals vary considerably in susceptibility to noise-induced hearing loss but nearly everyone will lose some hearing if exposed to sufficiently intense noise for a sufficient period of time. The U.S. Government's Occupational and Health Administration (OSHA) has specified the following permissible noise level exposures: Sound Duration Per

Day In Hours	Sound Level dBA, Slow Response
8	90
6	92
4	95
3	97
2	100
1 ½	102
1	105
½	110
¼ or less	115

According to OSHA, any exposure in excess of the above permissible limits could result in some hearing loss. Ear plugs or protectors to the ear canals or over the ears must be worn when operating this amplification system in order to prevent permanent hearing loss, if exposure is in excess of the limits as set forth above. To ensure against potentially dangerous exposure to high sound pressure levels, it is recommended that all persons exposed to equipment capable of producing high sound pressure levels such as this amplification system be protected by hearing protectors while this unit is in operation.

DISPOSAL OF OLD ELECTRICAL & ELECTRONIC EQUIPMENT



This symbol on the product or on its packaging indicates that it shall not be treated as household waste. Instead it shall be handed over to the applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequence for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. The recycling of materials will help to conserve natural resources. For more detailed information about recycling of this product, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

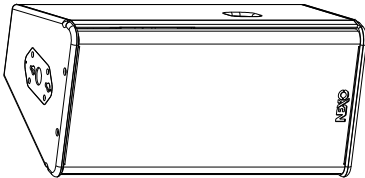
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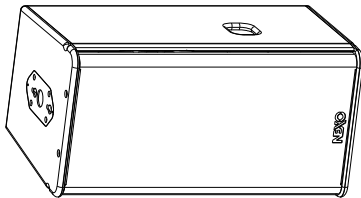
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1 INTRODUCTION

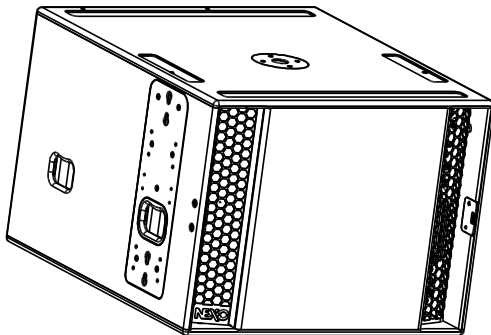
Thank you for selecting a NEXO GEO S12 Series Tangent Array System. This manual is intended to provide you with necessary and useful information about your GEO S12 System, which includes the following products:



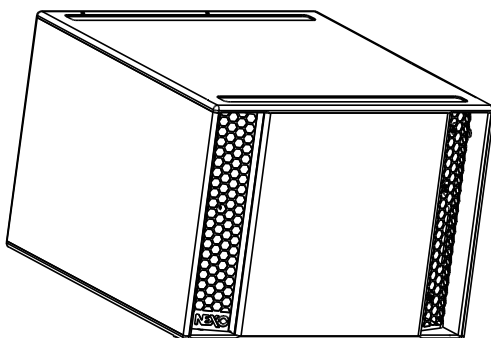
- GEO S1230 is a 30° Tangent Array Module. It comprises 1x12" (30cm) Neodymium 16 ohms LF/MF driver and 1x3" voice coil, 1.4" Throat 16 Ohm HF Driver loaded by a 28.5° Hyperboloid Reflective Wavesource™.



- GEO S1210 is a 10° Tangent Array Module. It comprises 1x12" (30cm) Neodymium 16 ohms LF/MF driver and 1x3" voice coil, 1.4" Throat 16 Ohm HF Driver loaded by a 5° Hyperboloid Reflective Wavesource™.

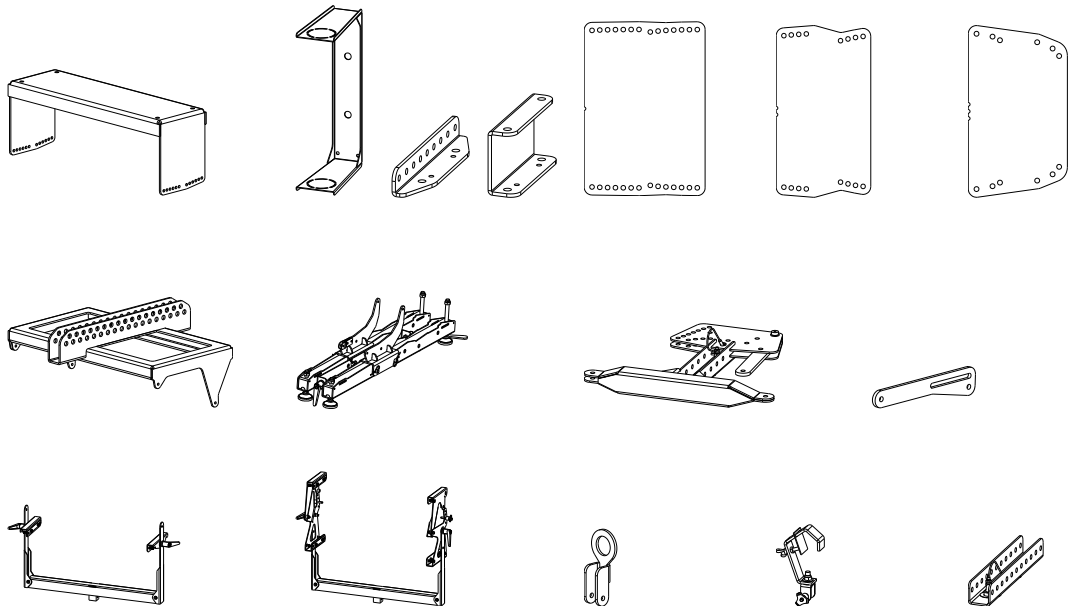


- LS18 is Geo S12 dedicated subwoofer. It comprises 1x18" (46cm) long excursion driver, and features very high efficiency as well as high acoustic output. LS18 has fittings for transporting, flying and pole standing.



- LS18e is identical to LS18, with the exception that it has none of the fittings described above. It is intended to be set on the floor in fix installations.

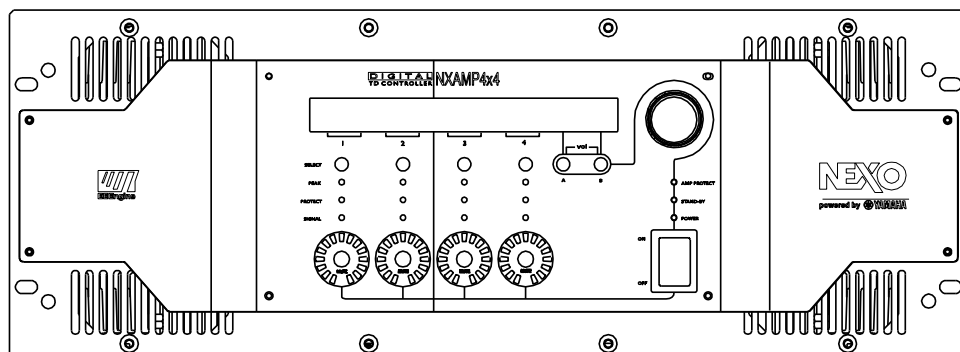
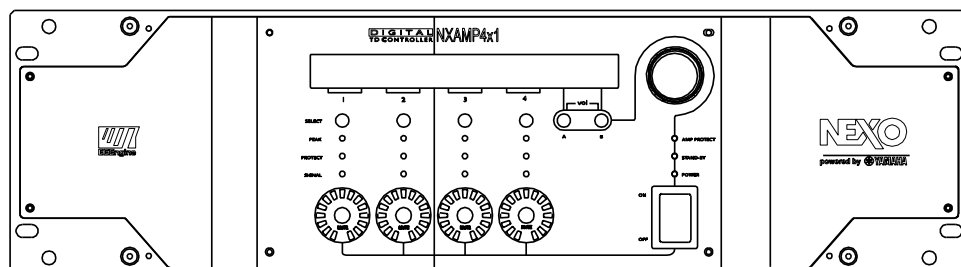
- GEO S12 Accessory Range. a full range of accessories that provides safe, flexible and simple means of installing Geo S12 Tangent Arrays in fixed installation as well as in touring applications.



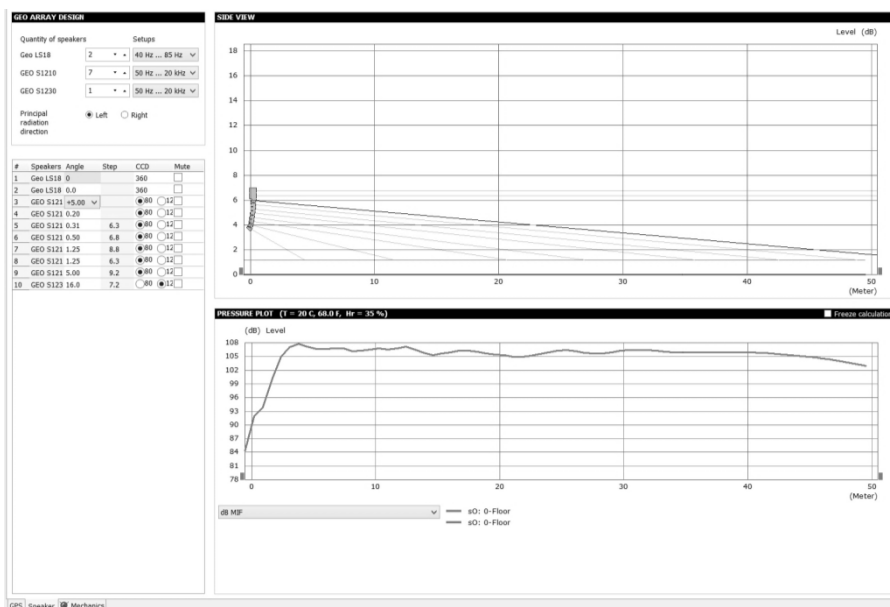
As for all NEXO systems, GEO S12s are controlled, powered and monitored by dedicated NEXO TDControllers:

- NXAMP4x1 and NXAMP 4x4 are Powered Digital Controllers, providing full control and amplification for RS15 in multiple configurations. Both devices feature 4 analogue inputs and 4 speaker outputs. When equipped with optional card, 4 digital inputs in Ethersound™ or Dante™ digital audio network format as well as remote control for all units in the network become available.

For a complete description of these controllers, please refer to User Manuals. NXAMP DSP algorithms and parameters are fixed in software and updated regularly: Please consult the NEXO web site (www.nexo.fr) for the latest software releases.



- NS-1 simulation software assists in the design and implementation of vertical tangent GEO arrays. Please consult the NEXO web site (www.NEXO.fr or www.NEXO-sa.com) for the latest software releases.



Please devote your time and attention to reading this manual. A comprehensive understanding of GEO theory, tangent arrays and specific features of GEO S12 and LS18 will help you to operate your system at its full potential.

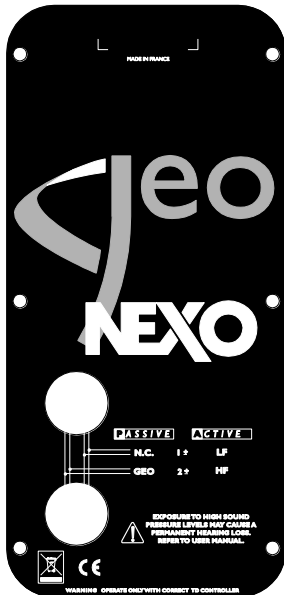
2 GEO S12 GENERAL SET-UP INSTRUCTIONS

2.1 Speaker connection

GEO S12 and LS18 is connected with Speakon NL4FC plugs (not supplied). A wiring diagram is printed on the connection panel located on the back of each cabinet. The 4 pins of the 2 Speakon sockets identified in / out are connected in parallel within the enclosure.

Either connector can be used to connect amplifier or to link to an additional Geo S12 cabinet or to link to an optional LS18 (if present). Therefore, a single 4-conductor cable can connect two amplifier channels to various Geo S12 and/or Sub Bass.

2.1.1 GEO S12 connectors



Connectors are wired as follows:

Speakon Connector	Passive Mode	Active Mode
1(-) ⇨	Not Connected	Geo S12 LF (-)
1(+) ⇨	Not Connected	Geo S12 LF (+)
2(-) ⇨	Geo S12 (-)	Geo S12 HF (-)
2(+) ⇨	Geo S12 (+)	Geo S12 HF (+)

2.1.2 LS18 connector



Connectors are wired as follows:

Speakon Connector	
1(-) ⇨	LS18 (-)
1(+) ⇨	LS18 (+)
2(-) ⇨	Not Connected
2(+) ⇨	Not Connected

2.1.3 Configuring Geo S12 for Passive or Active Mode

- Remove the six TORX screws that hold the connector panel (figure next page);
- Remove the connector panel so that filter WAGO connectors become accessible;
- In Passive Mode, connector A (from filter) should be inserted in connector B (PCB "Passive In"), and Connector D ("Passive Out") should be connected to speakers via connector C.
- In Active Mode, WAGO Connector A (from filter) should be directly connected into speakers via connector C (PCB connectors B & D are then unused).

2.1.4 Cabling

NEXO recommends the exclusive use of multi-conductor cables to connect the system: the cable kit is compatible with all the cabinets, and there is no possible confusion between LF, MF and HF sections.

Cable choice consists mainly of selecting cables of the correct sectional dimension (size) in relation to the load resistance and the cable length. Too small a cable section will increase both its serial resistance and its capacitance; this reduces the electrical power delivered to the loudspeaker and can also induce response (damping factor) variations.

For a serial resistance less or equal to 4% of the load impedance (damping factor = 25), the maximum cable length is given by:

$$L_{\max} = Z \times S \quad S \text{ in mm}^2, Z \text{ in Ohm, } L_{\max} \text{ in meters}$$

The table below indicates these values, for 3 common sizes.

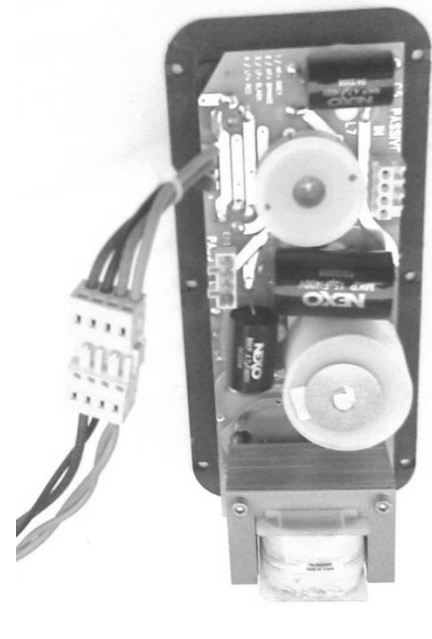
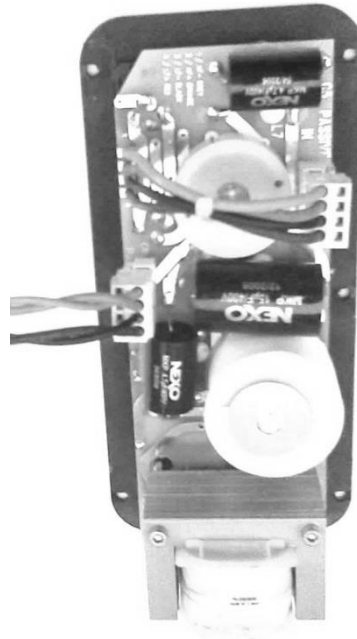
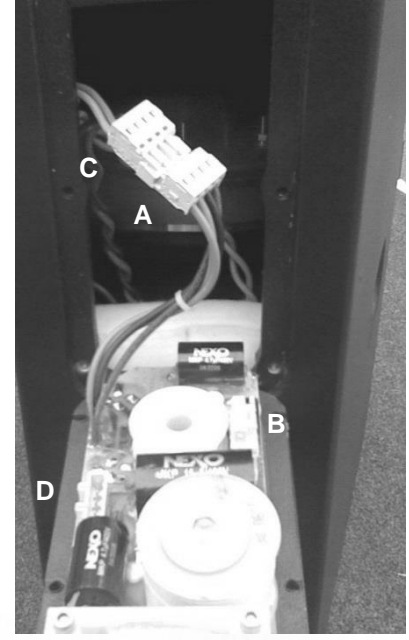
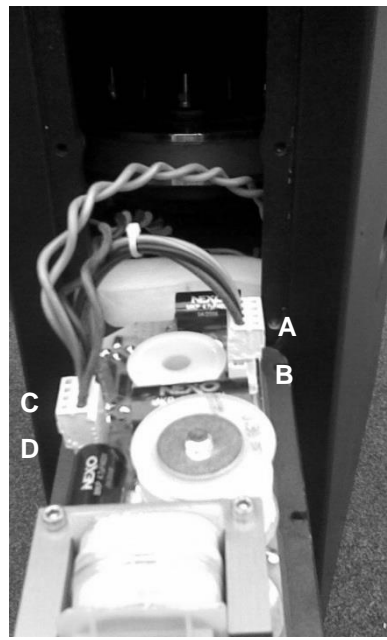
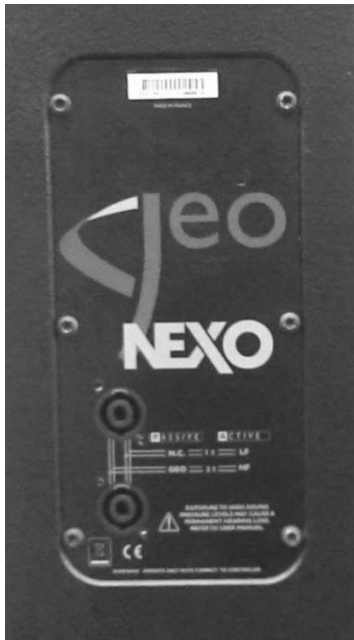
Load Impedance (Ω)	2	3	4	6	8	12	16
Cable section	Maximum Length (meters)						
1,5 mm ² (AWG #14)	3	4.5	6	9	12	18	24
2,5 mm ² (AWG #12)	5	7.5	10	15	20	30	40
4 mm ² (AWG #10)	8	12	16	24	32	48	64

2.1.5 Example:

- GEO S12 has a 16 Ohms nominal impedance in passive mode, so 4x Geo S12 wired in parallel will present a $16/4 = 4$ Ohm load impedance. The maximum acceptable 2x2.5 mm² (AWG #12) cable length L_{\max} for such a cluster is 10 meters.

IMPORTANT

Long speaker cables induce capacitive effects – up to hundreds of pF depending on the quality of the cable - with a low-pass effect on high frequencies. If long speaker cables must be used, ensure that they do not remain coiled while in use.



CONNECTOR PANEL

PASSIVE MODE

ACTIVE MODE

3 AMPLIFIER SELECTION FOR USE WITH GEO S12 & LS18

3.1 GEO S12, LS18 and NXAMP TDControllers

NEXO Powered TDControllers NXAMP 4X1 & 4X4 are integrated solutions for Control and amplification for all NEXO speaker ranges.

NXAMP4x1 and NXAMP4x4 power capability is listed in the table below:

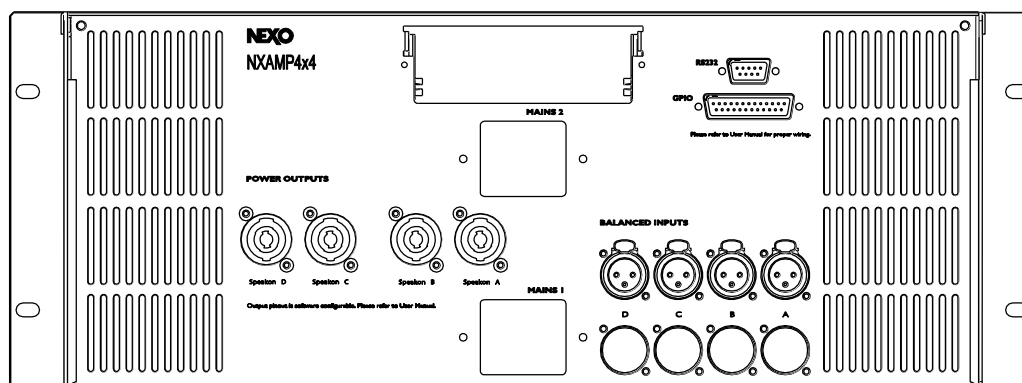
Mode	4 Channels	Bridge Stereo
NXAMP4x1	4 x 600 Watts / 8 Ohms 4 x 900 Watts / 4 Ohms 4 x 1300 Watts / 2 Ohms	2 x 1800 Watts / 8 Ohms 2 x 2600 Watts / 4 Ohms
NXAMP4x4	4 x 1900 Watts / 8 Ohms 4 x 3300 Watts / 4 Ohms 4 x 4000 Watts / 2 Ohms	2 x 6600 Watts / 8 Ohms 2 x 8000 Watts / 4 Ohms

3.1.1 NXAMP connectors

NXAMP4x1 and NXAMP4x4 rear panels feature:

- 4 analog inputs / outputs (links) on XLR3 connectors;
- 4 digital inputs / outputs on RJ45 connectors with optional NX-ES104 card;
- 4 speaker level outputs on NL4FC connectors.

Figure below shows connectors implementation on the rear panel.



3.1.2 GEO S12, LS18 and NXAMP recommended configurations

	Passive Mode	Active Mode
3 x GEO S12	1 channel of NXAMP4x1 in Bridge Stereo Mode 1 channel of NXAMP4x4 in 4 channels mode	2 channels of NXAMP4x1 in Bridge Stereo Mode 2 channels of NXAMP4x4 in 4 channels mode
4 x GEO S12	1 channel of NXAMP4x4 in 4 channels mode	2 channels of NXAMP4x4 in 4 channels mode
2 x LS18	1 channel of NXAMP4x1 in Bridge Stereo Mode 1 channel of NXAMP4x4 in 4 channels mode	

4 GEO S12 SETUPS ON NEXO TD CONTROLLERS

4.1 NXAMP TDControllers

As of today, load 3.15 features the setups listed in below table in the “Nexo configurations” menu.

Keep in mind that the “custom configuration menu” allows to build any combination of NEXO speakers with

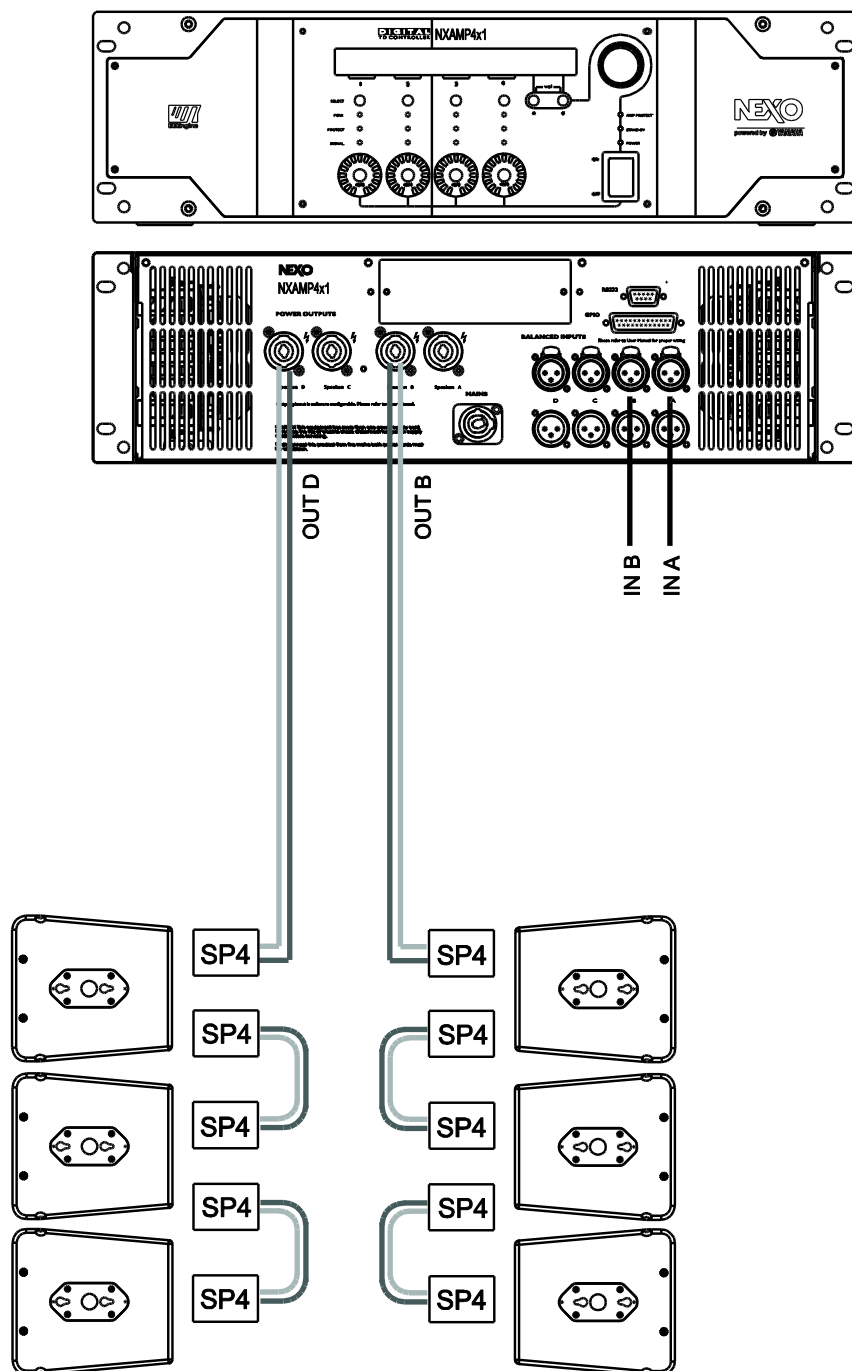
- full phase compatibility from 20 Hz to 20kHz.
- Choice between 85 Hz and 120 Hz X-over point between LS18 and Geo S12.

Please consult www.nexo-sa.com for upgrade releases.

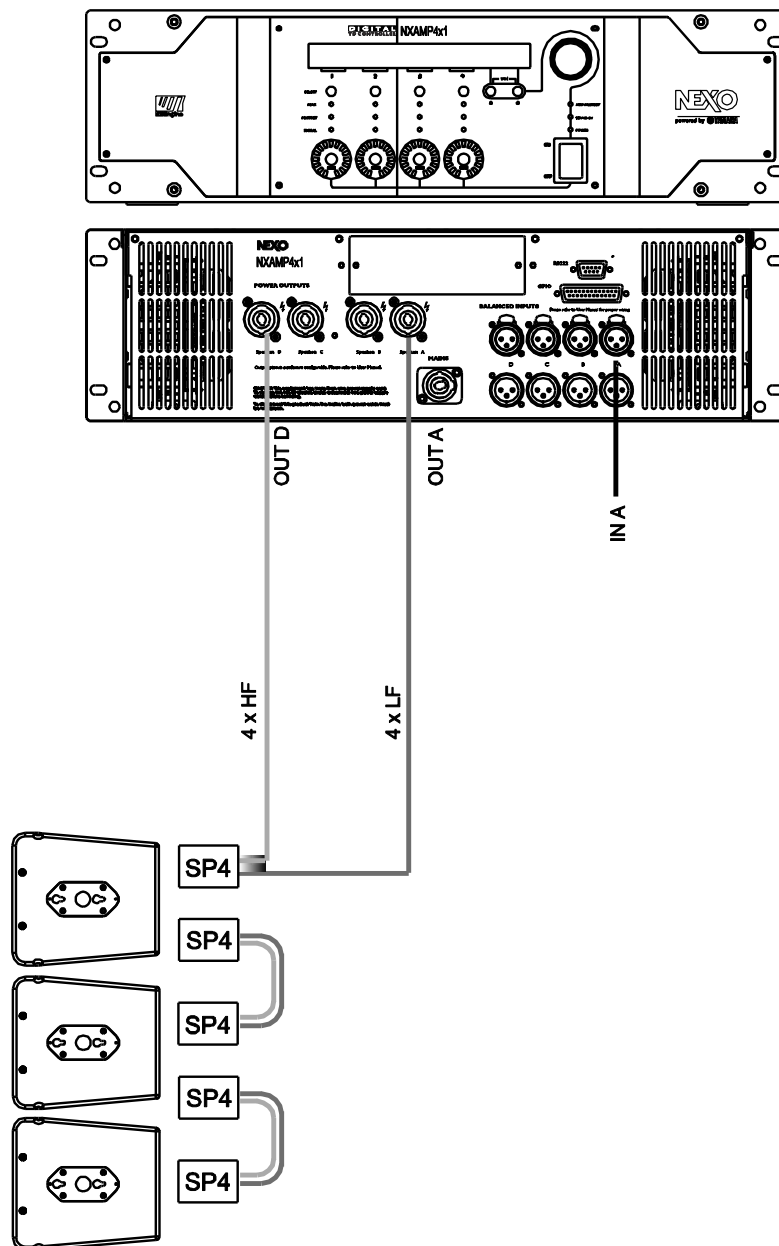
Setup Name	#	CH1	CH2	CH3	CH4
S1210 AC WB LF(1-3) HF(2-4)	50	S1210 LF 50-1k	S1210 HF 1k-20k	S1210 LF 50-1k	S1210 HF 1k-20k
S1210 PA WB 4 Channels	53	S1210 PA 50-20k	S1210 PA 50-20k	S1210 PA 50-20k	S1210 PA 50-20k
S1210 PA XO (2-4) LS18 (1-3)	55	LS18 35-85	S1210 PA 85-20k	LS18 35-85	S1210 PA 85-20k
S1230 AC WB LF(1-3) HF(2-4)	56	S1230 LF 50-1k	S1230 HF 1k-20k	S1230 LF 50-1k	S1230 HF 1k-20k
S1230 PA WB 4 Channels	59	S1230 PA 50-20k	S1230 PA 50-20k	S1230 PA 50-20k	S1230 PA 50-20k
S1230 PA XO (2-4) LS18 (1-3)	60	LS18 35-85	S1230 PA 85-20k	LS18 35-85	S1230 PA 85-20k

5 CONNECTION DIAGRAMS

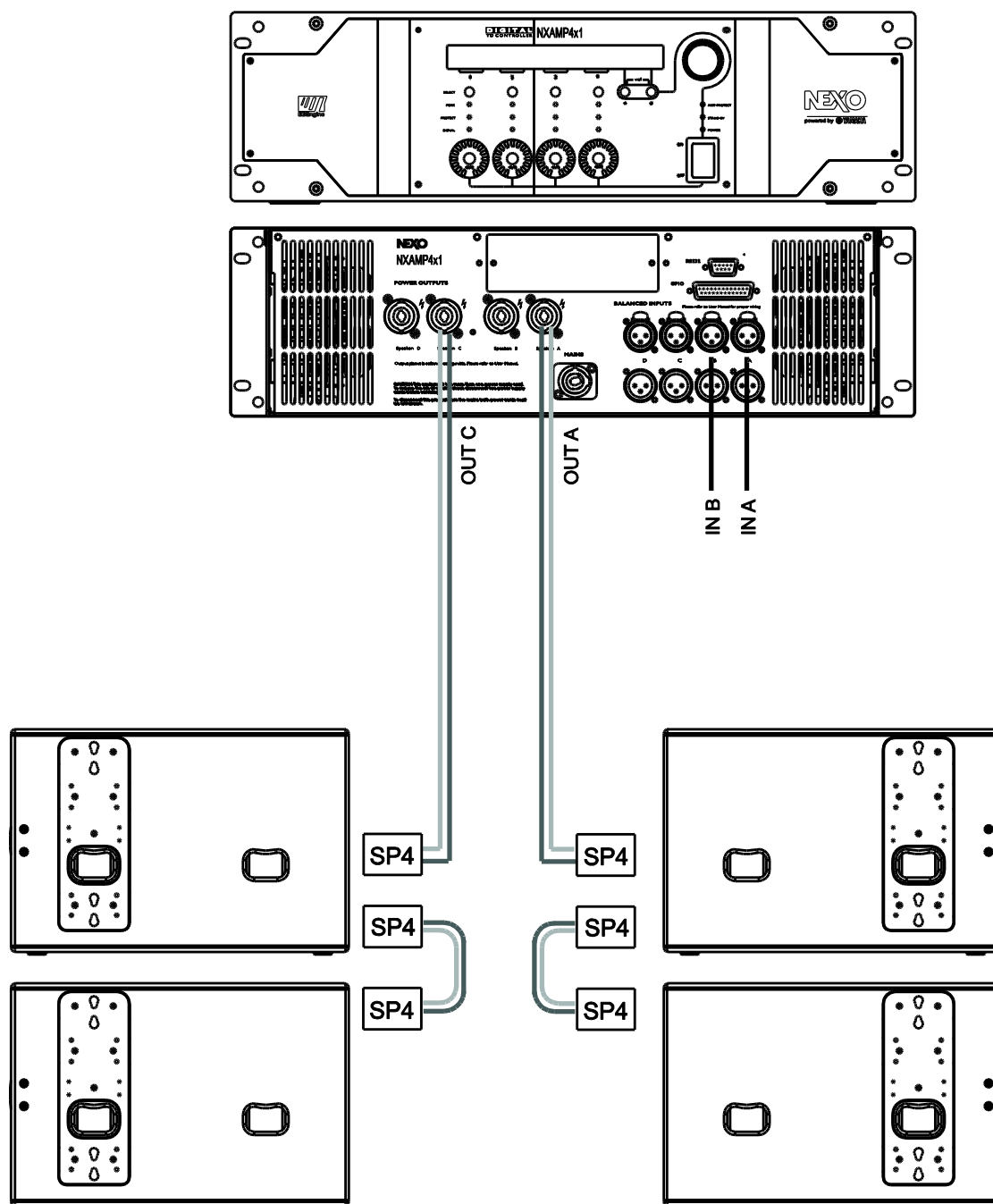
5.1 GEO S12 / NXAMP4x1 (Bridge Stereo – S12 in Passive mode)



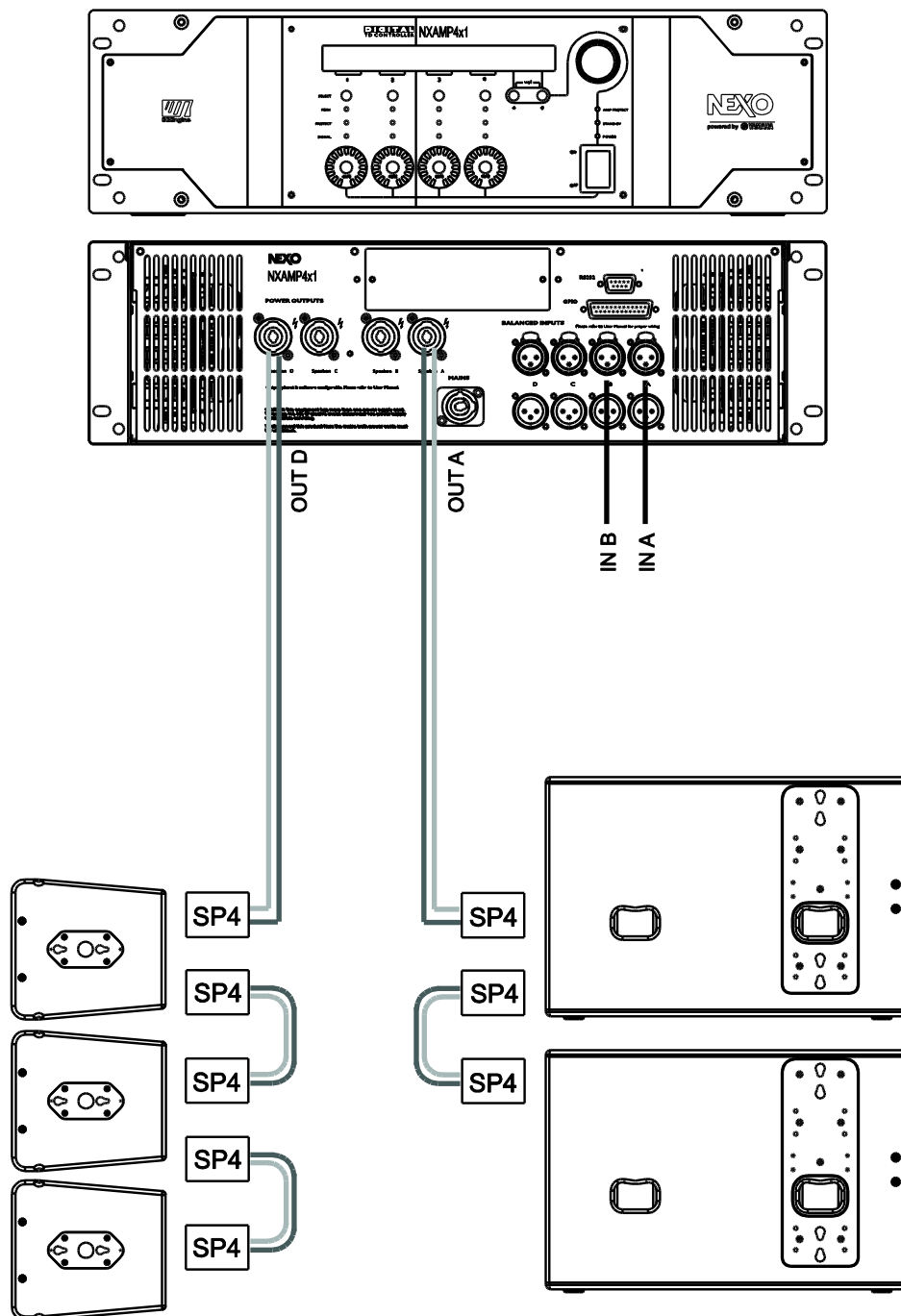
5.2 GEO S12 / NXAMP4x1 (Bridge Stereo – S12 in Active mode)



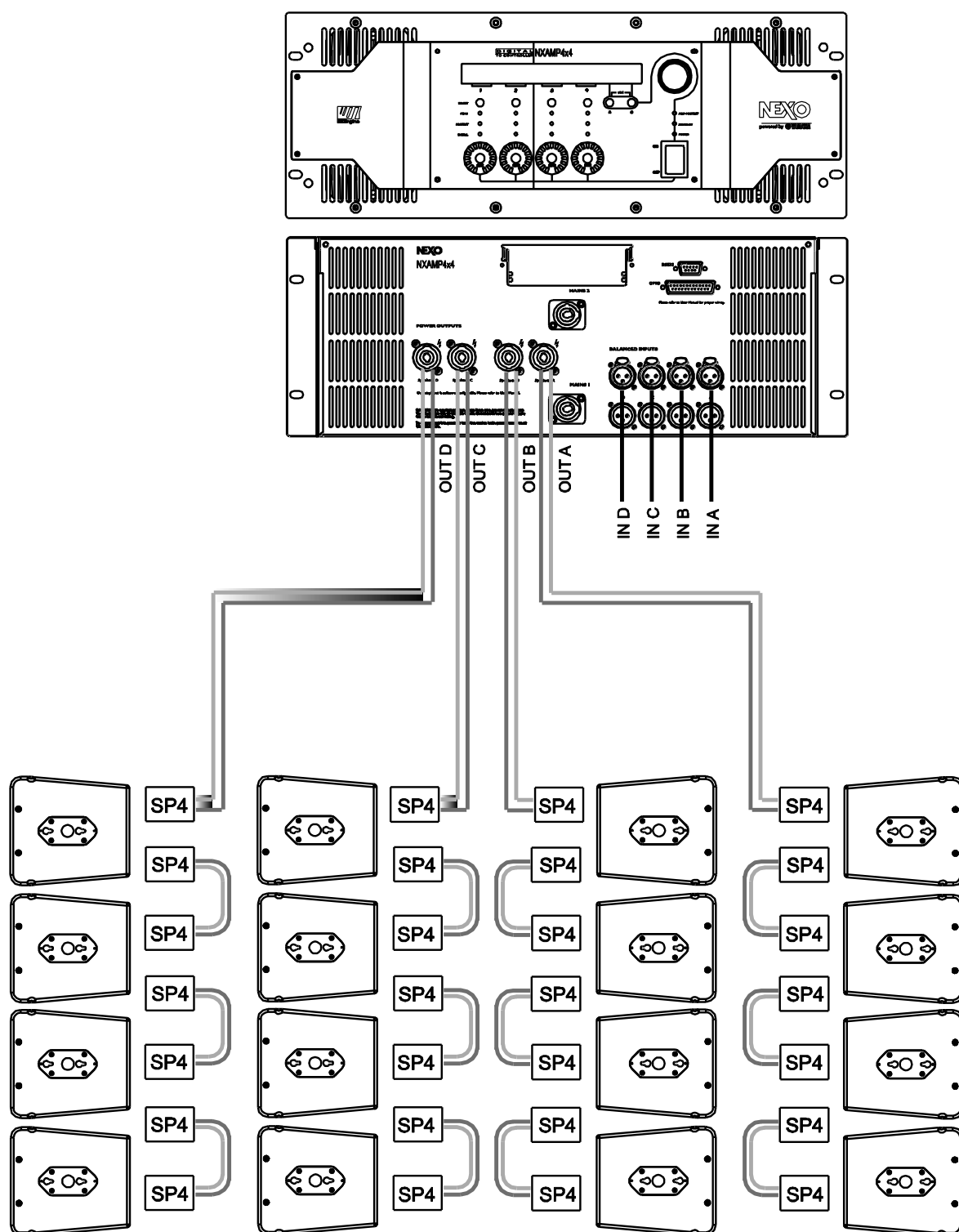
5.3 LS18 / NXAMP4x1 (Bridge Stereo)



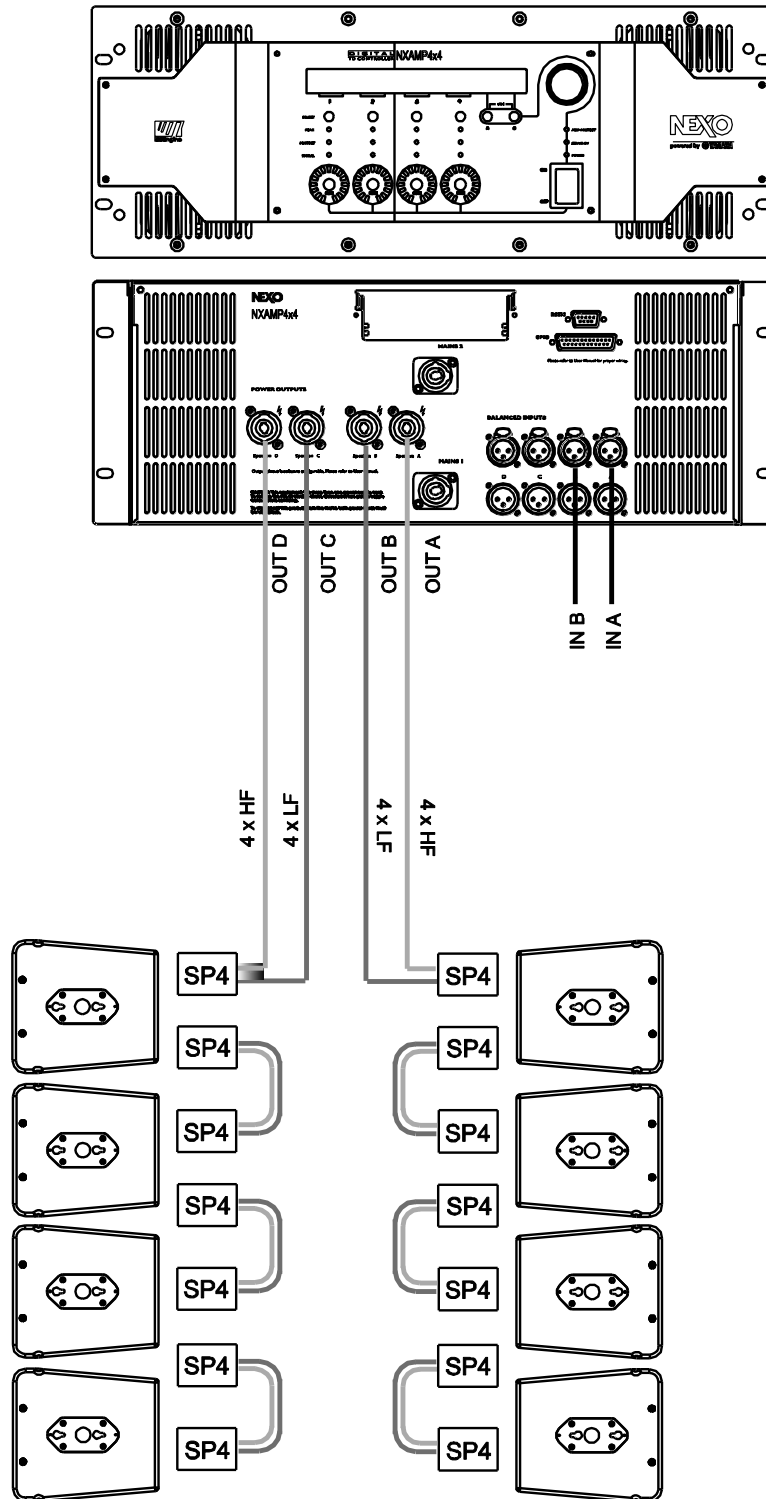
5.4 LS18 & Geo S12 / NXAMP4x1 (Bridge Stereo – S12 in Passive mode)



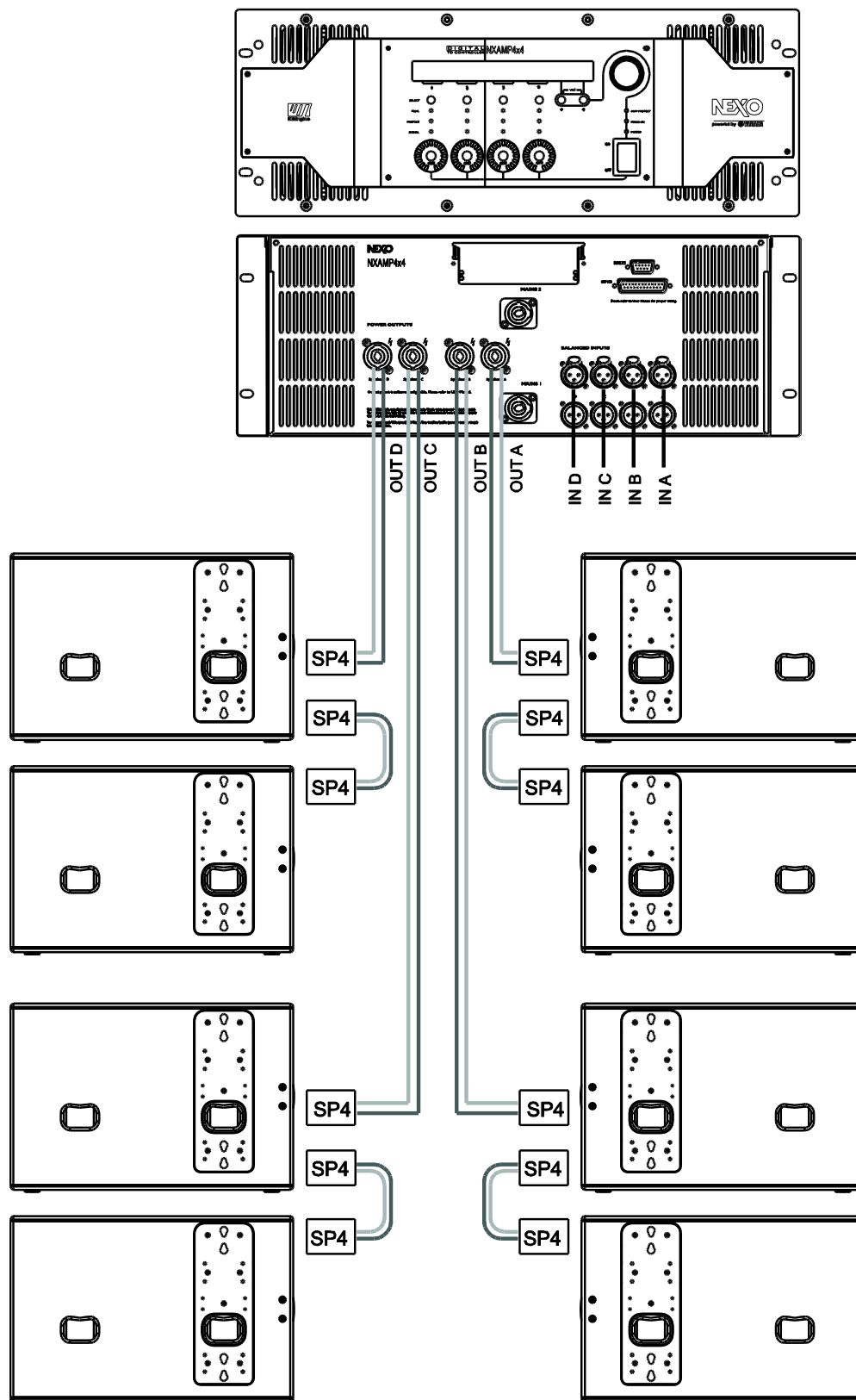
5.5 GEO S12 / NXAMP4x4 (4 Channels – S12 in Passive mode)



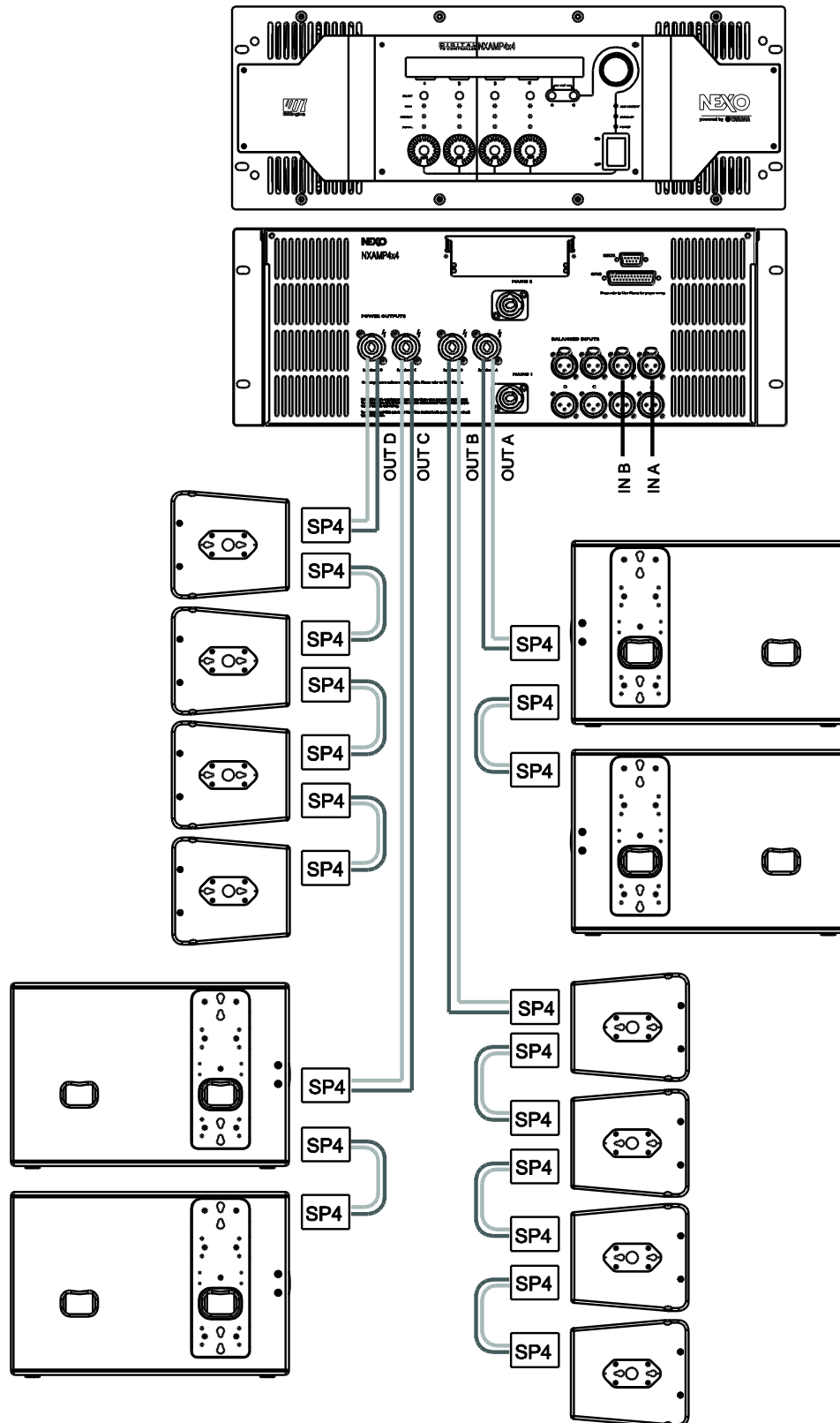
5.6 GEO S12 / NXAMP4x4 (S12 in Stereo Active mode)



5.7 LS18 / NXAMP4x4 (4 channels)



5.8 LS18 & GEO S12 NXAMP4x4 (S12 in Passive Mode)



6 NS-1 SIMULATION SOFTWARE

NS-1 software is a R&D simulation tool derived application. It processes measured speaker data with complex mathematical algorithms to assist the user in optimizing system design. Due to the complexity of the interaction of multiple cabinets, it is simply not possible to reliably design curved vertical arrays without using the processing power of a computer to predict the optimum array structure for a given audience geometry. The design logic is far more complex than looking at a section drawing of the venue, measuring the overall angle needed to cover the audience from the cluster location, and dividing by 10 degrees to determine the required amount number of GEO S1210 cabinets.

NS-1 is an easy to use tool that allows to shape the energy leaving the cluster to fit the audience. It predicts pressure levels radiated from the system to ensure enough cabinets are provided for the application, as well as mechanical constraints for safe flown systems.

In addition, it provides mechanical information for all clusters in agreement with Structural Analysis Reports (available in the Help section): dimensions, weight, gravity center position, forces, moments, working load and safety factor.

Geo S12 Structural Analysis Reports have been validated by German Certification Organization RWTUV systems GmbH.

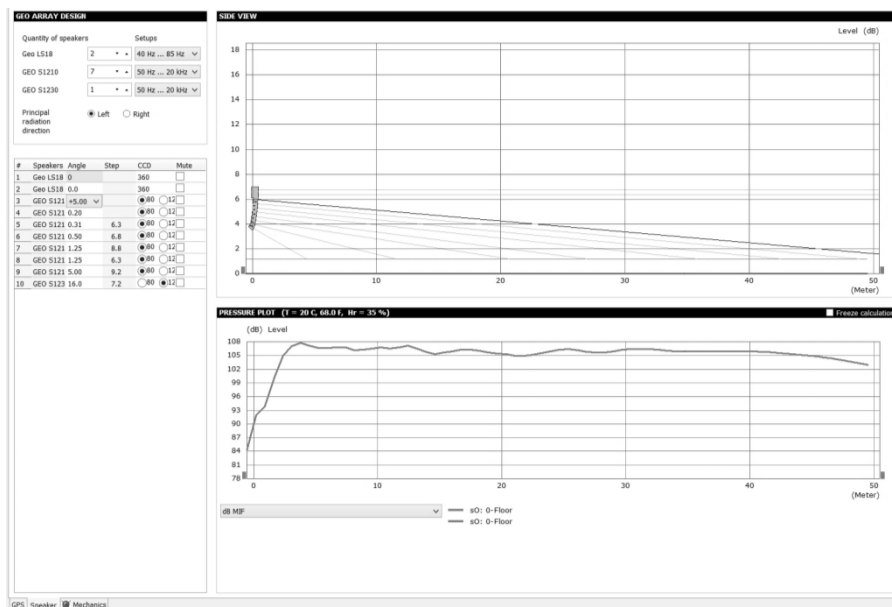
NS-1 installation package includes all NEXO User Manuals, Structural Analysis Reports and Certificates PDF files (which can be found in the last section of User Manuals).

NS-1 is a freeware available on www.nexo-sa.com

IMPORTANT

Never install a GEO S12 & LS18 cluster without checking its acoustical performances and mechanical safety in NS-1 prior to installation.

Any question or bug report please contact technical@nexo.fr



NS-1 GEO S12 ACOUSTIC PAGE

7 CONFIGURABLE DIRECTIVITY DEVICE

The GEO Wavesource controls dispersion of acoustic energy using an hyperboloid acoustical reflector in the “coupling plane” (the vertical plane of a curved vertical tangent array) and a diffraction slot in the “non-coupling plane” (the horizontal plane of a curved vertical tangent array). The patented Configurable Directivity Device consists of bolt-on flanges that alter the diffraction slot’s exit flare rate.

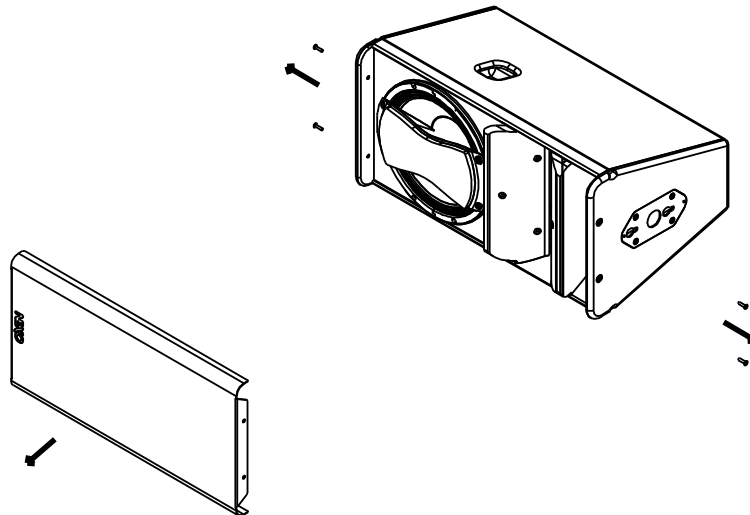
7.1 Installing & removing GEO’s Configurable Directivity flanges

GEO S12 are shipped in the 80° dispersion configuration;

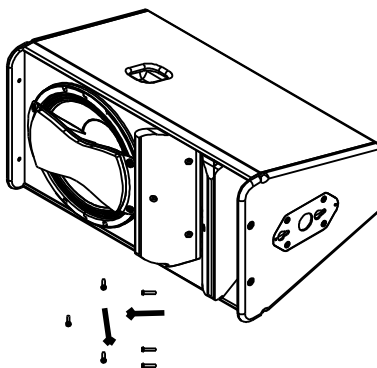
120° flanges is an optional accessory.

To change dispersion in the non-coupling plane to 120°:

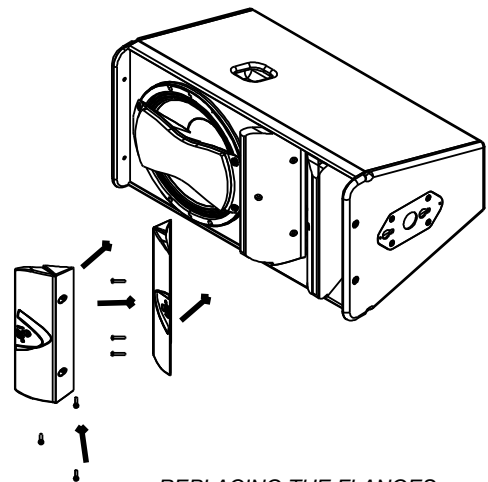
- Remove the front grill (drawings below);
- Remove the three TORX (5x25) screws per flange on each side of the GEO Waveguide (drawings below);
- Install the 120° flanges with the six TORX screws
- Re-install the grid, being careful that the NEXO logo must be on the 12” loudspeaker side.



REMOVING THE GRILL



REMOVING THE SCREWS

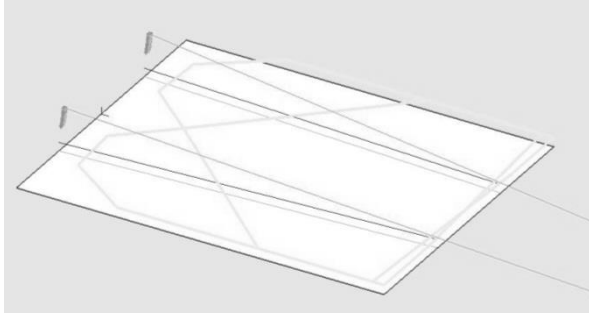


REPLACING THE FLANGES

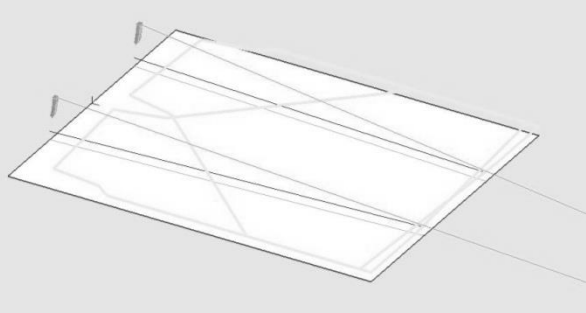
7.2 When & where to use Configurable Directivity flanges

The diagrams show audience area coverage for a stereo system. While the GEO cluster will deliver even SPL from the front to the rear of this audience area, there are “holes” near the front in the centre and at the outside edges. We cannot fill the outside coverage gaps without enlarging the centre gap, and vice versa (left figure below).

If 120° Configurable Directivity Devices are installed at the bottom cabinet of the clusters, coverage will look more like the pattern in right figure below.



-6dB coverage, all GEO S12 in 80° configuration

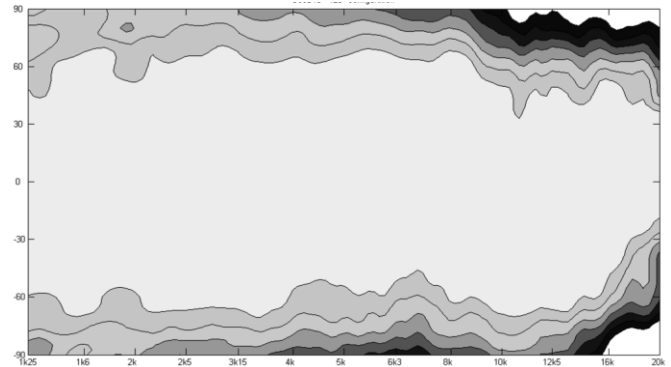
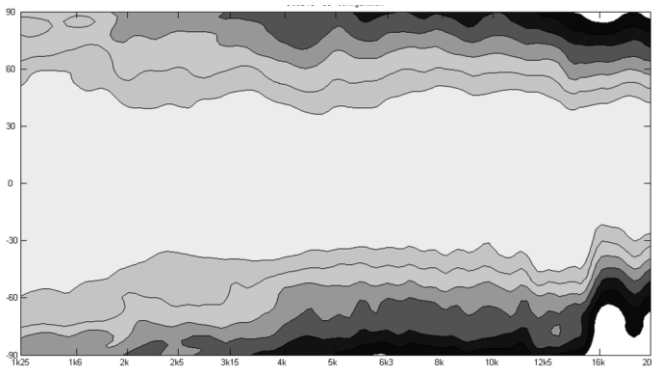


-6dB coverage, bottom GEO S12 in 120° configuration

In curved vertical arrays, the 120° Configurable Directivity Device can be used:

- On the bottom row of curved vertical arrays, to fill in coverage gaps in the front rows.
- On all rows of curved vertical arrays, in cases where 120° of horizontal coverage is preferred to 80°.

Figure below shows isocontour coverage for 80° and 120° configurations.



80° AND 120° CONFIGURATIONS ISOCONTOUR COVERAGE

8 GEO S12 HARDWARE SETUP PROCEDURE

Before proceeding with assembly of GEO S12 & LS18 arrays, please ensure that the components are present and undamaged. A component list is appended to this manual. In the event of any shortage, please contact your supplier.

For maximum efficiency the GEO S12 & LS18 rigging system requires three experienced persons for set-up: typically one motor hoist operator, and one operator per side of the array. Good synchronisation and crosscheck between the operators are key elements for a reliable and safe set-up.

8.1 **SAFETY FIRST**

GEO S12 & LS18 Rigging System structural computations and related documents are available in NS-1 or at Nexo (info@nexo.fr) upon request.

We include this section to remind you of safe practice when flying the GEO S12 & LS18 system. Please read it carefully. However, user must always apply his or her knowledge, experience and common sense. If in any doubt, seek advice from your supplier or NEXO agent.

This manual offers guidance only for GEO S12 & LS18 loudspeaker systems. References in this manual to other rigging equipment such as motor hoists, steels, shackles etc. are made to clarify the description of rigging procedures. The user must ensure that operators are properly trained by other agencies in the use of these items.

The GEO S12 & LS18 Rigging System has been optimised for the deployment of curved vertical or horizontal tangent arrays of GEO S12 & LS18 loudspeakers. Angle adjustment between cabinets has been limited to specific settings to ensure correct acoustic coupling.

The GEO S12 & LS18 Rigging System is a professional precision tool set, and should be handled with extreme care. Only persons who are fully conversant with the operation of the GEO S12 & LS18 Rigging System and provided with suitable safety equipment should deploy GEO Arrays. Misuse of the GEO S12 & LS18 Rigging System could lead to dangerous consequences.

Used and maintained correctly, the GEO S12 & LS18 Rigging System will give many years of reliable service in portable systems. Please take the time to read and understand this manual. Always use NS-1 to determine the optimum angle settings for a particular venue, hang point and curved vertical GEO S12 & LS18 cluster. Applied forces and moments are strongly cabinet quantity and angle configuration dependent. Cluster configuration must be implemented and validated in NS-1 prior to installation.

8.1.1 **Flown Systems Safety**

- Always inspect all the rigging components and cabinets for damage before assembly. Pay special attention to the lifting points, and safety clips. If you suspect that any of the components are damaged or defective, DO NOT USE THE AFFECTED PARTS. Contact your supplier for replacements.
- Read this manual carefully. Also be familiar with the manuals and safe working procedures for any ancillary equipment that will be used with the GEO S12 & LS18 Rigging System.
- Applied forces and moments are strongly cabinet quantity and angle configuration dependent. Cluster configuration must be implemented and validated in NS-1 prior to installation.
- Ensure that all local and National regulations regarding the safety and operation of flying equipment are understood and adhered to. Information on these regulations can usually be obtained from Local Government Offices.

- When deploying a GEO S12 & LS18 system always wear protective headwear, footwear and eye protection.
- Do not allow inexperienced persons to handle a GEO S12 & LS18 system. Installation personnel should be trained in loudspeaker flying techniques and should be fully conversant with this manual.
- Ensure that motor hoists, hoist control systems and ancillary rigging components are currently certified as safe and that they pass a visual inspection prior to use.
- Ensure that public and personnel are not allowed to pass beneath the system during the installation process. The work area should be isolated from public access.
- Never leave the system unattended during the installation process.
- Do not place any object, no matter how small or light, on top of the system during the installation procedure. The object may fall when the system is flown and is likely to cause injury.
- Secondary safety steels must be installed once the system has been flown to the operating height. Secondary steels must be fitted irrespective of requirements of the local safety standards applicable to the territory.
- Ensure that the system is secure and prevented from pivoting around the motor hoist.
- Avoid any form of excessive dynamic loading to the assembly (structural computations on GEO S12 & LS18 Rigging System are based on a 1/1.2 factor for hoist or motor acceleration).
- NEVER attach any item to the GEO S12 & LS18 system other than the GEO S12 & LS18 accessories.
- When flying outdoor systems ensure that the system is not exposed to excessive wind or snow loads and is protected from rainfall.
- The GEO S12 & LS18 Rigging System requires regular inspection and testing by a competent test centre. NEXO recommend that the system is load tested and certified annually or more frequently if local regulations require.
- When de-rigging the system ensure that the same duty of care is given to the procedure as for the installation. Pack GEO S12 & LS18 components carefully to prevent damage in transit.

8.1.2 Ground Stacking Safety

Statistically, many more injuries occur due to unstable ground stacked PA systems than those associated with flown systems. There are several reasons for this fact, however the message is clear:

- Always survey the supporting structure upon which a ground stack is to be built. Always look beneath PA wings to inspect the deck support and if necessary ask for the stage scrims and dressings be removed to allow access.
- If the stage surface slopes, as it does in some theatres, ensure that the system is prevented from sliding forwards due to vibration. This may require the fitting of timber battens to the stage floor.
- For outdoor systems ensure that the system is protected from wind forces which might cause the ground stack to become unstable. Wind forces can be huge, especially upon large systems, and should never be underestimated. Observe meteorological forecasts, calculate the “worst case” effect upon the system prior to erection and ensure that the system is secured appropriately.
- Take care when stacking cabinets. Always employ safe lifting procedures and never attempt to build stacks without sufficient personnel and equipment.

- Never allow anyone, whether operators, artists or members of the public to climb onto a ground stacked PA system. Anyone who needs to climb over 2m (6 ft) high should be fitted with suitable safety equipment including a clip-on harness. Please refer to local Health and Safety legislation in your territory. Your dealer can help with advice on access to this information.
- Apply the same attention to all safety matters when de-stacking systems.
- Be aware that safety procedures are as important in the truck and in the warehouse as they are at the venue.

8.1.3 Contacts

Correct training is fundamental to safe practise when working with loudspeakers flying systems. NEXO recommend that users contact local industry associations for information on specialist course.

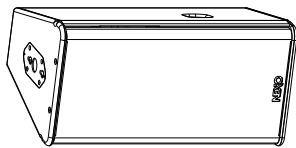
Information for International training agencies can be obtained by contacting either:

The Production Services Association
(PSA),
School Passage,
Kingston-upon-Thames,
KT1 SDU Surrey,
ENGLAND
Telephone: +44 (0) 181 392 0180

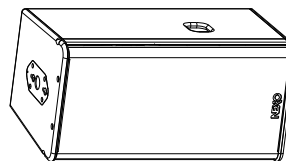
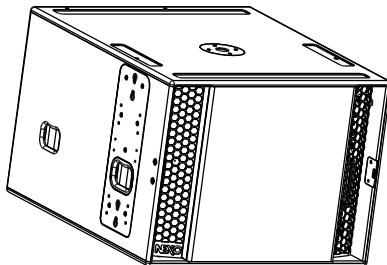
Rigstar Training and Testing Center
82 Industrial Dr. Unit 4
Northampton, Massachusetts
01060 U.S.A.
Phone: 413-585-9869 -- Fax: 413-585-
9872
school@rigstar.com

ESTA
Entertainment Services & Technology Association
875 Sixth Avenue, Suite 1005
NEW YORK, NY 10001 USA
Phone: 212-244-1505 – Fax: 212-244-1502
info@esta.org - www.esta.org

8.2 General Description

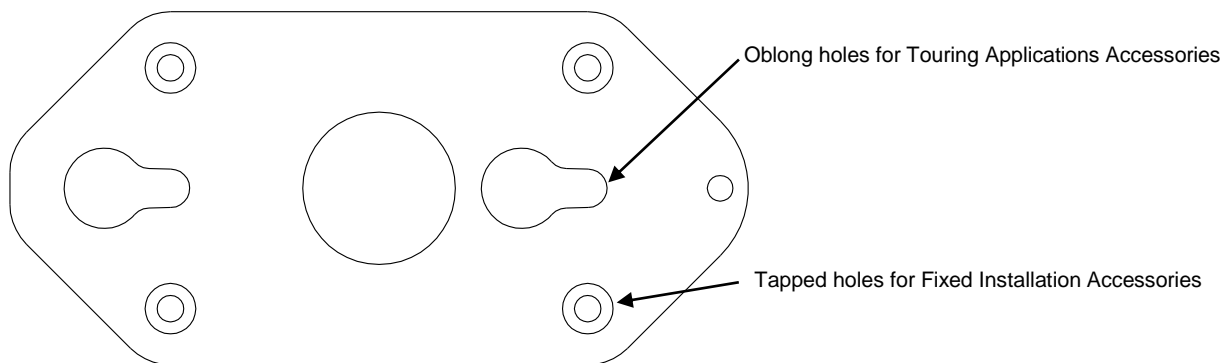


GEO S1230

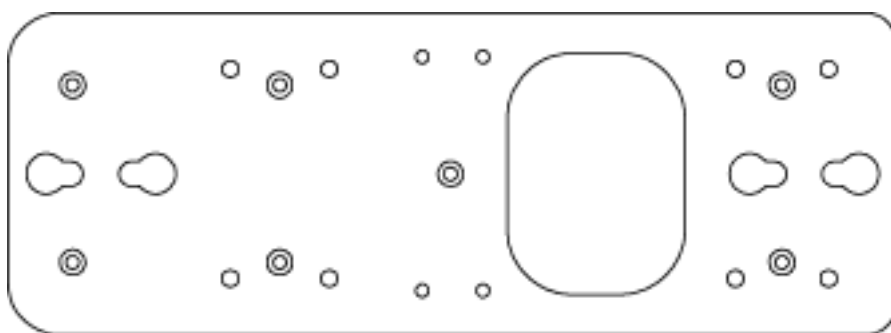


GEO S1210

GEO S1230, GEO S1210 and LS18 incorporate two connecting plates (one per side) on which a comprehensive range of accessories can be mounted.



GEO S12 CONNECTING PLATES

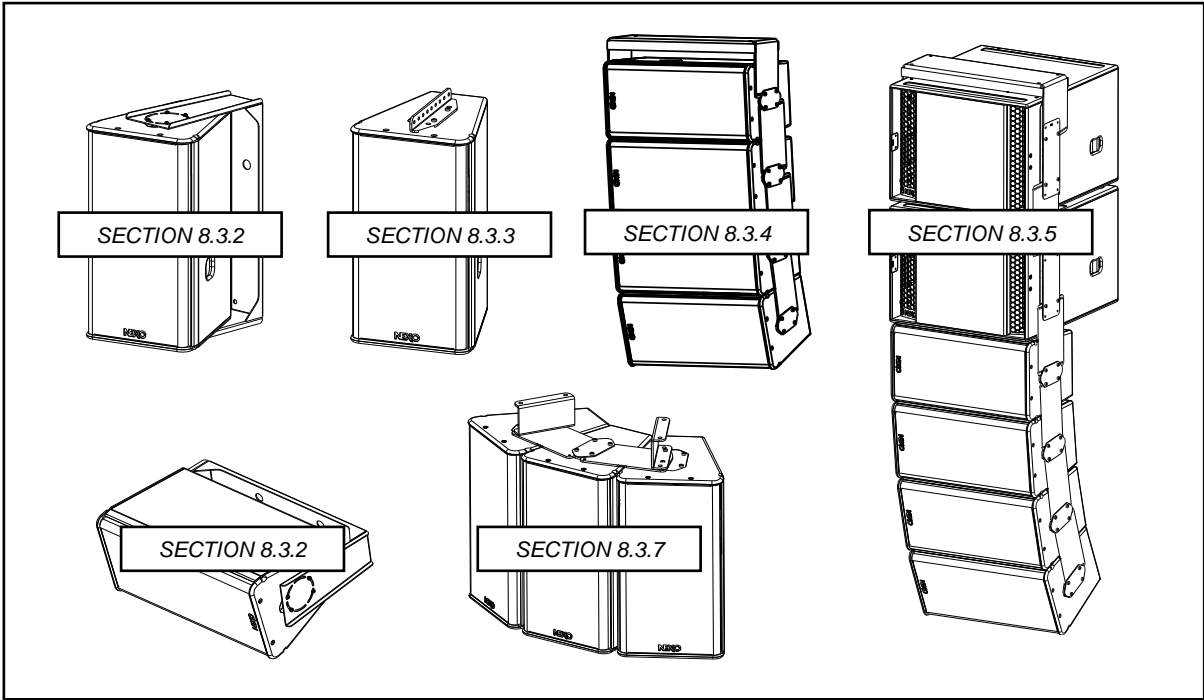


LS18 CONNECTING PLATES

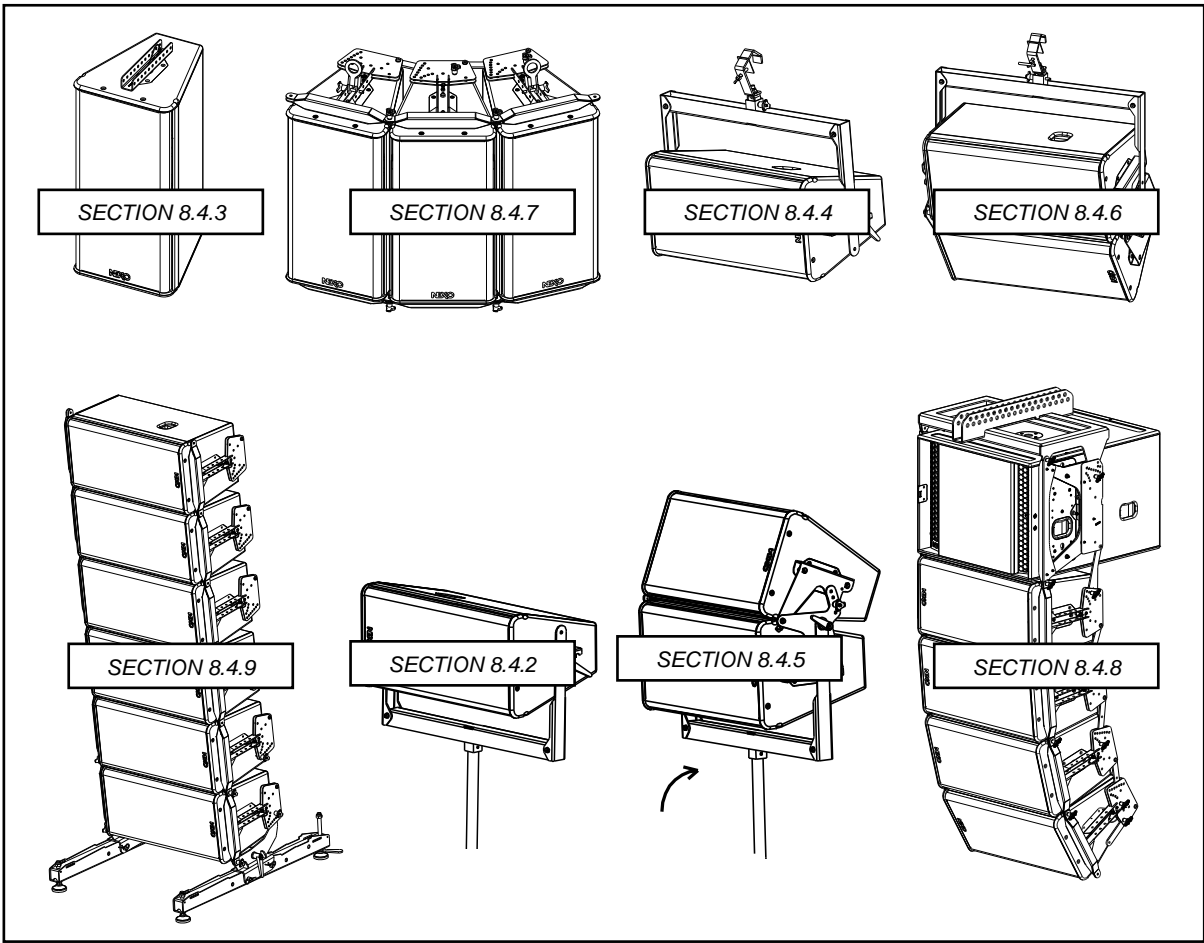
There are two families of accessories:

- fixed installation accessories, which are designed to be screwed on the connecting plates;
- touring accessories, which can be installed or removed with a quick connecting system.

8.2.1 Described configurations



FIXED INSTALLATIONS



TOURING APPLICATIONS

8.2.2 WARNINGS ON GEO S12 ACCESSORIES

WARNING 1

All GEO S12 & LS18 Accessories are specifically rated in agreement with structural computations.

Never use other accessories – including push-pins - when assembling GEO S12 & LS18 cabinets than the ones provided by NEXO: NEXO will decline responsibility over the entire GEO S12 & LS18 accessory range if any component is purchased from different supplier.

WARNING 2

For SAFETY reasons, following first generation accessories:

- GEOS12-XBOW
- GEOS12-TCBRK
- GEOS12-SSBRK
- GEOS12-PSBRK
- GEOS12-TTC

Have been recalled in August 2007 and **MUST NO LONGER BE USED**

These accessories have been replaced by:

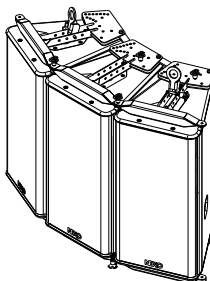
- GPT-XBOW-V2
- GPT-TCBRK-V2
- GPT-SSBRK-V2
- GPT-PSBRK-V2
- GPT-TTC-V2

Please contact your local distributor if any doubt in relation the GEO S12 & LS18 accessories you are using.

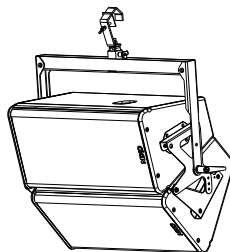
WARNING 3

All GEO S12 accessories have been designed so that cabinets are arrayed in the acoustic coupling plane (adjacent waveguides as shown in figures below).

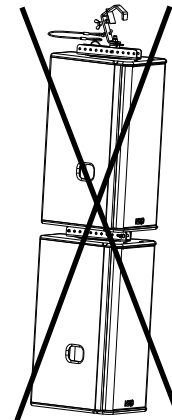
GEO S12 assemblies in the “non-coupling plane” – as shown in figure below- are UNSAFE and STRICTLY PROHIBITED.



YES



YES



NO

8.3 GEO S12 in fixed installations

8.3.1 Fixed installation Accessories and kits

Accessories are:

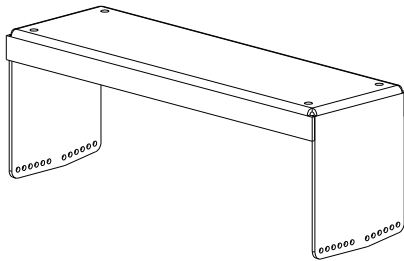
- Bumper for Geo S12 & LS18 (VNI-BUMPER1)
- “U” Bracket (VNI-UBRK12)
- “L” Bracket for cable suspension (VNI-LBRK)
- “U” Bracket for rigid suspension (VNI-ABRK)
- Connecting Plates / range : 0.20° - 3.15° (VNI-ANPL1)
- Connecting Plates / range : 5.00° - 10.0° (VNI-ANPL2)
- Connecting Plates / range : 16.0° - 30.0° (VNI-ANPL3)
- Counter-Plates for LS18 (LSI-CPLA)
- Counter Plates for Geo S12 (VNI-CPLA)

Please refer to section 13.4 of this manual for more information of above references.

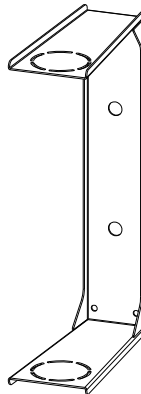
IMPORTANT

In order to prevent screws from getting loose in fixed installations, use blocking liquid LOCTITE™ 243 or equivalent for all screws used with GEO S12 & LS18 fixed installation accessories.

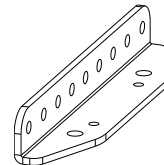
LOCTITE™ 243 is available at NEXO or at your local distributor upon request.



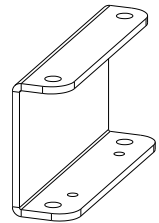
VNI-BUMPER



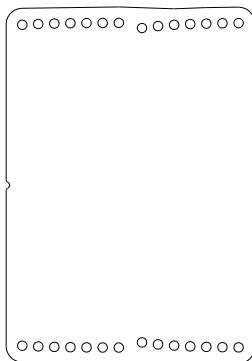
VNI-UBRK12



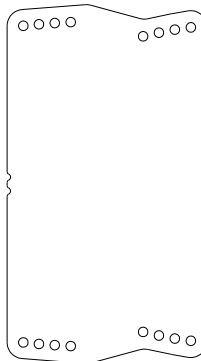
VNI-LBRK



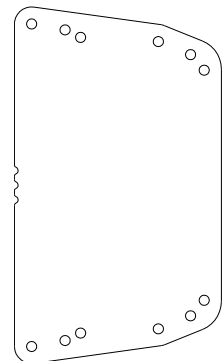
VNI-ABRK



VNI-ANPL1



VNI-ANPL2



VNI-ANPL3

8.3.2 Single GEO S12 rigidly mounted on a wall or a ceiling (vertical or horizontal)

Required items

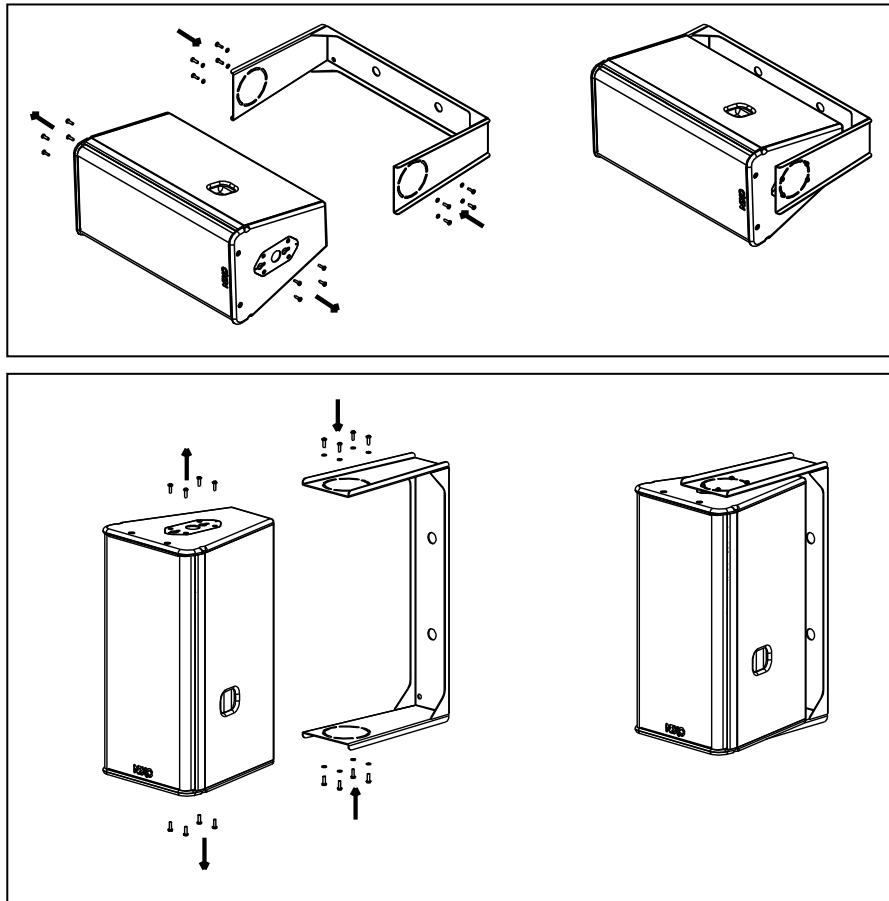
- 1 x GEOS12-UBRK (allows all angles to be implemented)
- 4 x 12mm diameter screws (*not provided*)

IMPORTANT

Ensure that the surface – wall or ceiling – is strong enough to hold GEO S12 weight and that the for screws 12mm diameter and corresponding plugs required to fix the “U” bracket on the wall or under the ceiling are properly dimensioned.

Procedure

- For screws 12mm diameter (not provided) are required to secure the “U” Bracket on the wall or ceiling;
- Remove the four TORX screws holding connector plates on both sides of GEO S12;
- Position the GEO S12 inside the “U” Bracket to desired angle; “U” bracket oblong holes must be properly aligned with panels holes;
- Apply Loctite 243 or equivalent to the eight screws and washers from VNI-UBRK12 kit;
- Connect “U” bracket to cabinet with these screws.



8.3.3 Single GEO S12 cable mounted on a wall or a ceiling (vertical or horizontal)

Required items

- 1 or 2 x VNI-LBRK (allows cable suspension, holes for cable suspension are 10mm diameter);
- 2 or 4 slings and corresponding shackles (not provided)

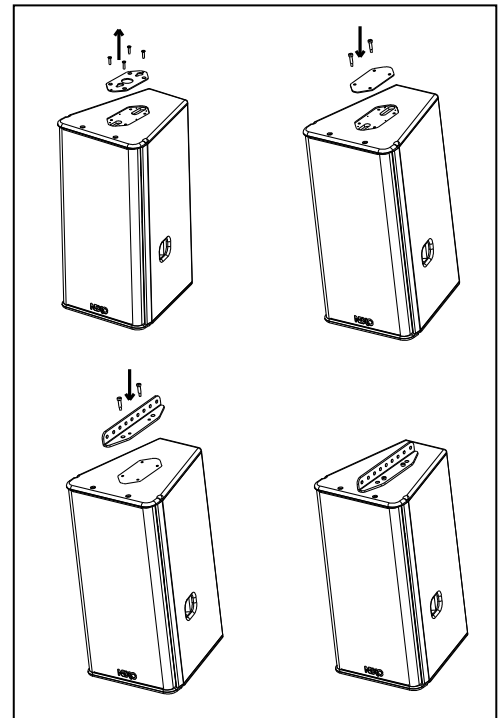
IMPORTANT

Ensure that the ceiling is strong enough to hold GEO S12 weight and that the cable suspension system required to install the cabinet under the ceiling is properly dimensioned.

Procedure

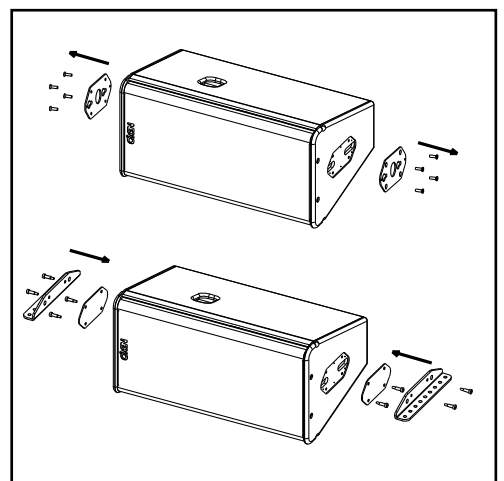
Vertical

- Remove the four TORX screws holding connector plate on upper side of GEO S12;
- Remove the connector plate from Geo S12;
- Apply Loctite 243 or equivalent to the 4 shoulder screws from VNI-LBRK;
- Position external plate from VNI-LBRK kit and secure it using the 2 of the 4 shoulder screws;
- Position “L” bracket from VNI-LBRK kit, and secure it to the cabinet using the 2 remaining shoulder screws;
- Slings and shackles (not provided) are required to secure the cluster under the ceiling;



Horizontal

- Remove the four TORX screws holding connector plates on both side of GEO S12;
- Remove the connector plates from Geo S12;
- Apply Loctite 243 or equivalent to the 4 shoulder screws from VNI-LBRK;
- Position external plates from VNI-LBRK kits and secure them using the shoulder screws;
- Position “L” brackets from VNI-LBRK kits, and secure them to the cabinet using the 4 remaining shoulder screws;
- Slings and shackles (not provided) are required to secure the cluster under the ceiling;



8.3.4 GEO S12 vertical array rigidly mounted on a ceiling

Required items

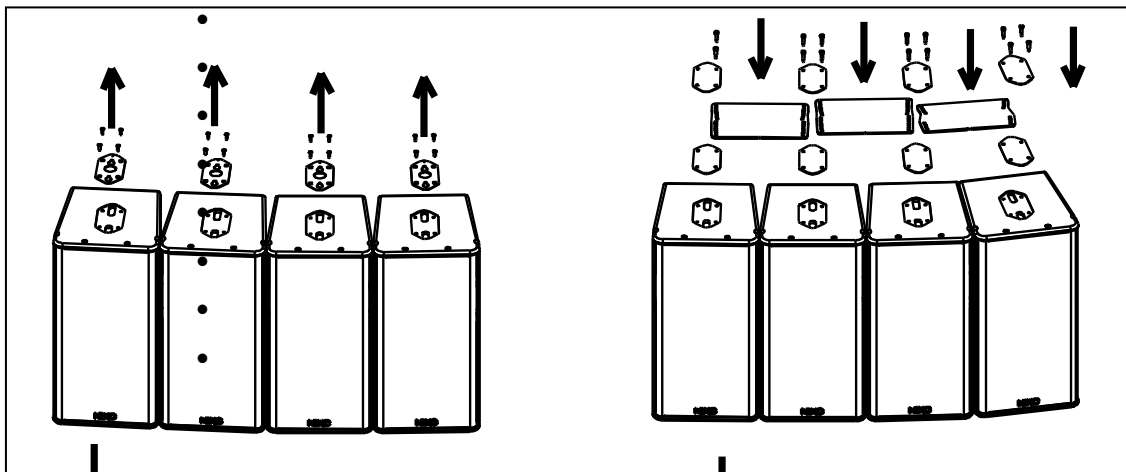
- 1 x VNI-BUMPER (allows +/-5° bumper tilt when installed below a flat surface; if higher bumper tilt is required, surface will have to be defined accordingly) ;
- (N-1) x VNI-ANPL for a N x GEO S12 array (ANPL1 ranges from 0.2° to 3.15°, ANPL2 ranges from 5° to 10°, ANPL3 ranges from 16° to 30°)
- N x VNI-CPLA for a N x GEO S12 array
- Four 12mm diameter screws (*not provided*)

IMPORTANT

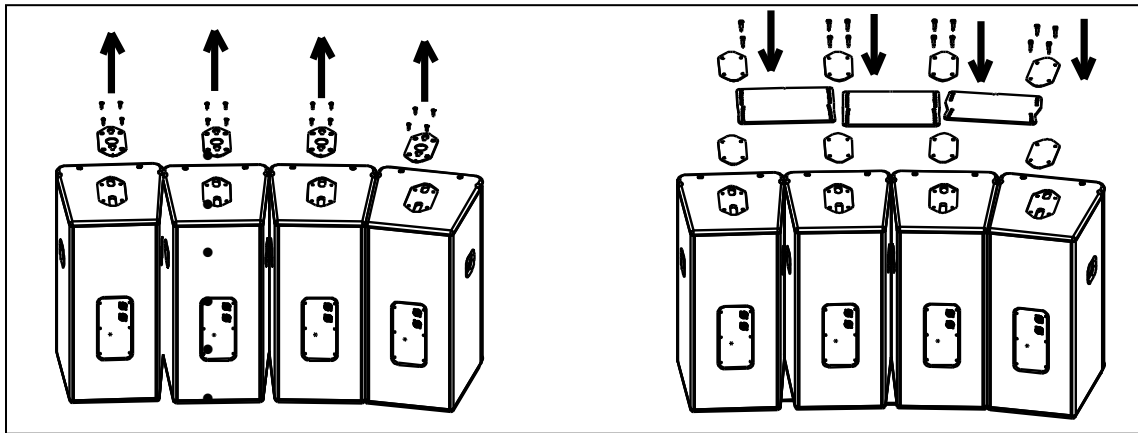
Ensure that the ceiling is strong enough to hold GEO S12 cluster weight and that the four screws 12mm diameter and corresponding plugs required to fix the bumper under the ceiling are properly dimensioned.

Procedure

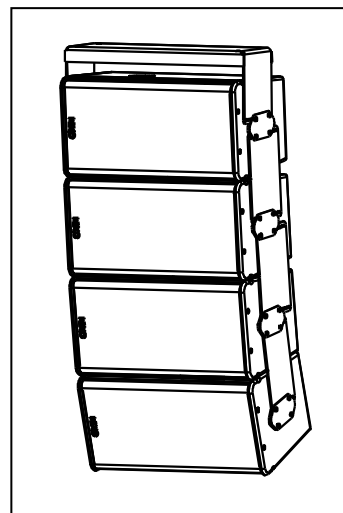
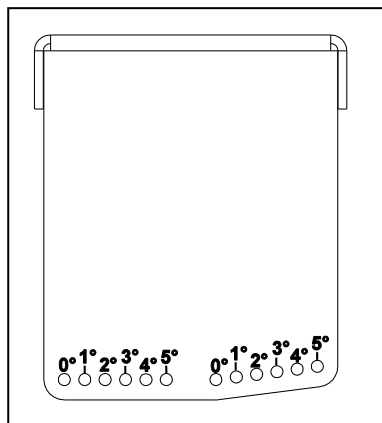
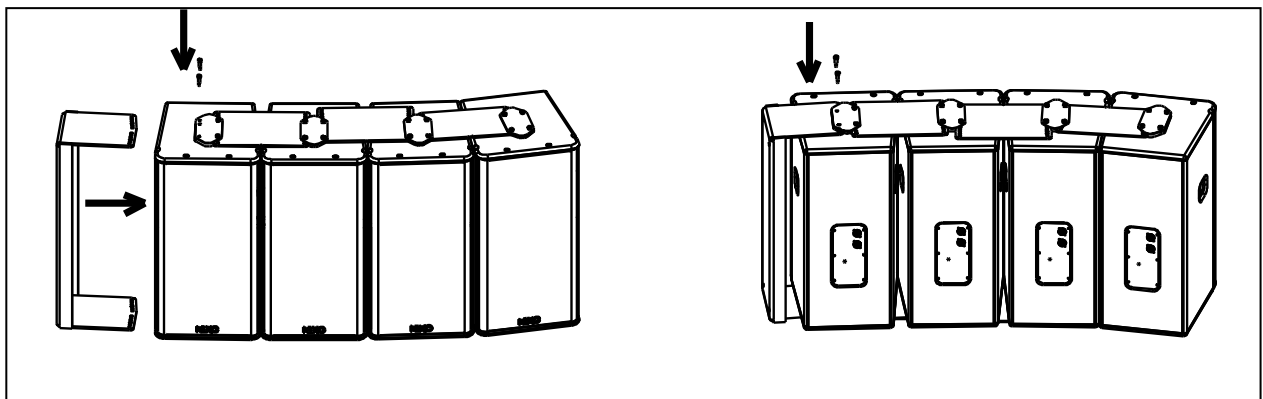
- (1) Set all GEO S12 sideways according to cluster configuration;
- (2) Remove the four TORX screws holding connector plates on upper side of all GEO S12's;
- (3) Remove the connector plates from all Geo S12's;
- (4) Position bottom counter-plates, angle plates and top counter-plates from VNI-ANPL and VNI-CPLA to required inter-cabinet angle value between cabinets upper sides;
- (5) Apply Loctite 243 or equivalent to shoulder screws from VNI-CPLA kits;
- (6) Screw shoulder screws so that all plates and cabinets are tightened together;



- (7) Flip the cluster upside down to access connector plates located on the down side;
- (8) Repeat all above steps from #2 to #6;



- (9) Apply Loctite 243 or equivalent to four shoulder screws from the last VNI-CPLA kit;
- (10) Position the VNI-BUMPER bumper to required angle position and use the four shoulder screws to connect it the bumper to the top cabinet;



- (11) Flip GEO S12 cluster by 90° so that it is ready to be positioned under the ceiling;
- (12) Four screws 12mm diameter (not provided) are required to secure the bumper under the ceiling.

8.3.5 LS18 & GEO S12 vertical array rigidly mounted on a ceiling

Required items

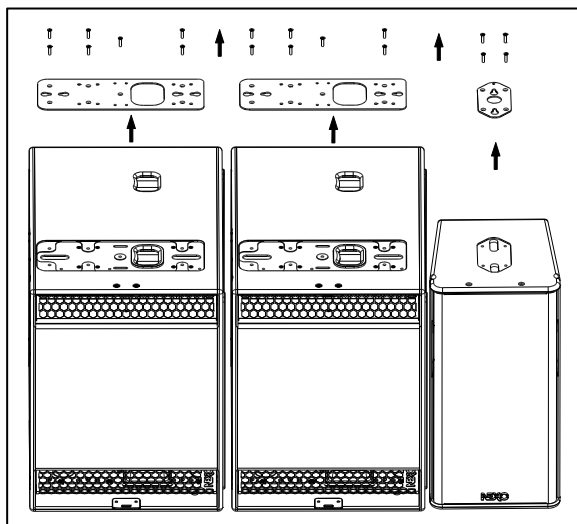
- 1 x VNI-BUMPER (allows +/-5° bumper tilt when installed below a flat surface; if higher bumper tilt is required, surface will have to be defined accordingly) ;
- (M-1) x VNI-ANPL1 for M x LS18
- M x LSI-CPLA counter-plates for M x LS18
- N x VNI-ANPL for a N x GEO S12 (ANPL1 ranges from 0.2° to 3.15°, ANPL2 ranges from 5° to 10°, ANPL3 ranges from 16° to 30°)
- N x LSI-CPLA counter-plates for N x GEO S12
- Four 12mm diameter screws (*not provided*)

IMPORTANT

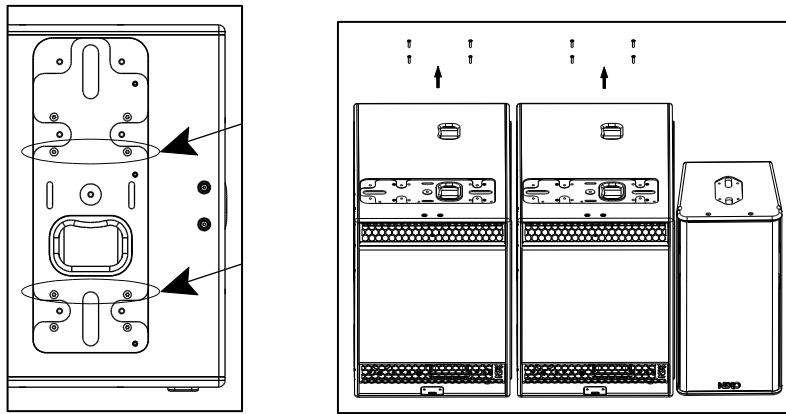
Ensure that the ceiling is strong enough to hold LS18 & GEO S12 cluster weight and that the four screws 12mm diameter and corresponding plugs required to fix the bumper under the ceiling are properly dimensioned.

Procedure

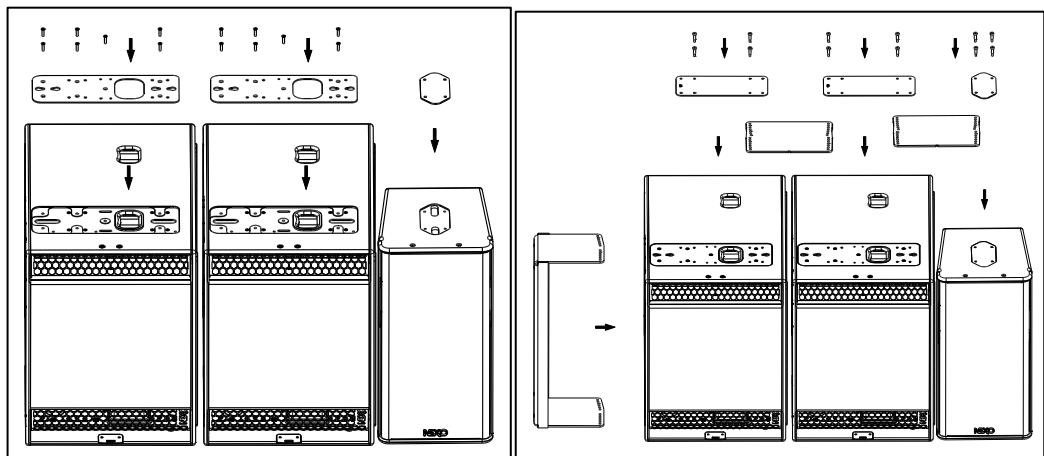
- (1) Set LS18s and GEO S12s sideways according to cluster configuration;
- (2) Remove the TORX screws holding connector plates on upper side of all LS18s and GEO S12s;
- (3) Remove the connector plates from all LS18 and Geo S12s;



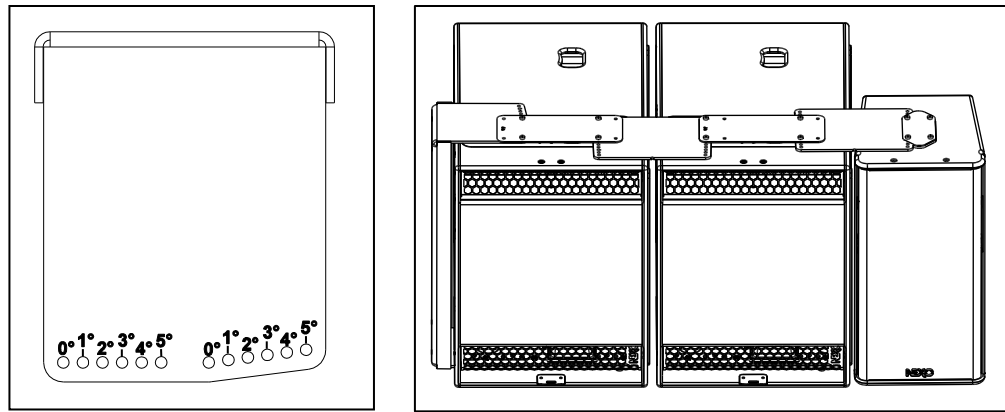
- (4) Remove the 4 locking screws from LS18 side wood panel (see figure below), these are no longer to be used;



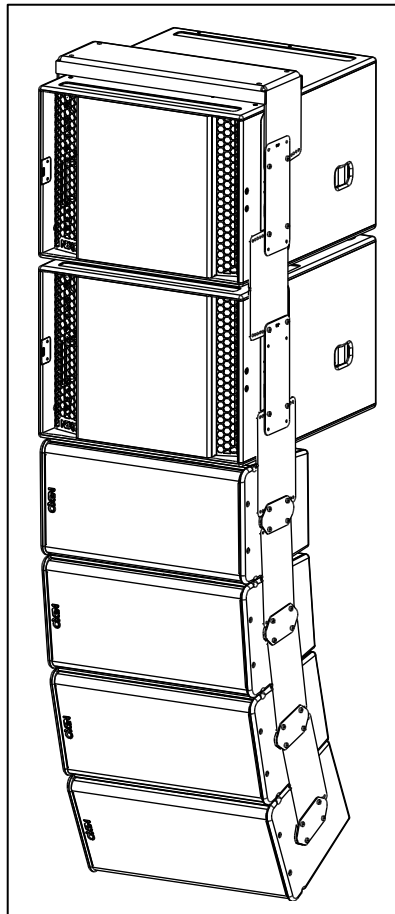
- (5) Apply Loctite 243 or equivalent to the screws that attach the LS18 connector plate to the cabinet, and reinstall the LS18 connector plates (see figure below left);
- (6) Position Geo S12 bottom counter-plates (see figure below left);
- (7) Position VNI-ANPL1 angle plates (set at 0.2°) and LSI-CPLA top counter-plates on LS18 upper sides according to figure below right ;
- (8) Position angle plates and top counter-plates from VNI-ANPL and VNI-CPLA to required GEO S12 inter-cabinet angle value between GEO S12 upper sides according to figure below right;
- (9) Apply Loctite 243 or equivalent to shoulder screws from LSI-CPLA and VNI-CPLA kits;
- (10) Screw all shoulder screws so that all plates and cabinets are tightened together;



- (11) Flip the cluster upside down to access connector plates located on the down side;
- (12) Repeat all above steps from #2 to #10;
- (13) Position the VNI-BUMPER bumper to required angle position and use the four shoulder screws to connect it the bumper to the top cabinet;



- (11) Flip cluster by 90° so that it is ready to be positioned under the ceiling;
- (12) Four screws 12mm diameter (not provided) are required to secure the bumper under the ceiling.



8.3.6 LS18 and GEO S12 vertical array cable mounted on a ceiling

Required items

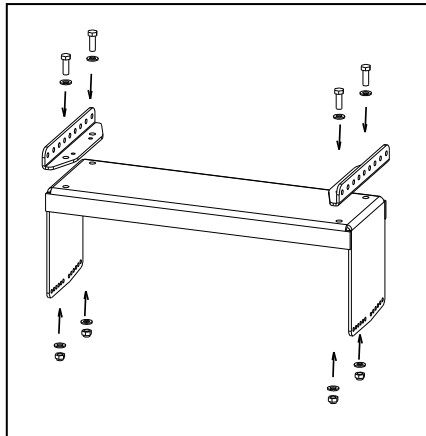
- As in 2 sections above, plus
- 2 x VNI-LBRK (allows cable suspension for bumper, holes for cable suspension are 10mm diameter);
- 4 slings and shackles (not provided)

IMPORTANT

Ensure that the ceiling is strong enough to hold LS18 & GEO S12 cluster weight and that the cables suspension system required fixing the bumper under the ceiling is properly dimensioned.

Procedure

- Connect the bumper and the two “L” brackets using the screws, washers and bolts provided in the VNI-LBRK kit;



- Proceed as in preceding sections;
- 4 slings and 4 shackle (not provided) are required to secure the cluster under the ceiling;

8.3.7 GEO S12 horizontal array rigidly mounted on a ceiling

Required items

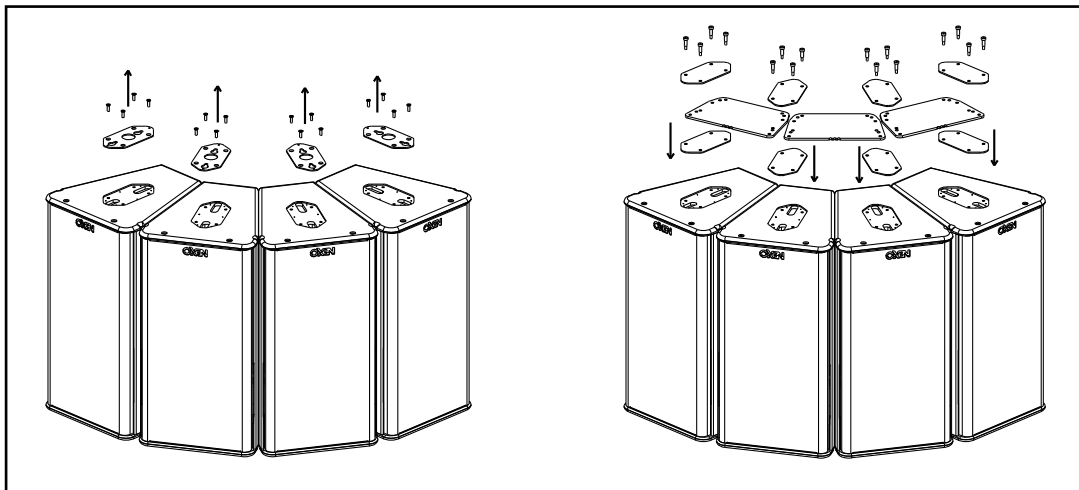
- 2 x VNI-ABRK (allows rigid ceiling suspension for horizontal arrays)
- (N-1) x VNI-ANPL for a N x GEO S12 array (ANPL1 ranges from 0.2° to 3.15°, ANPL2 ranges from 5° to 10°, ANPL3 ranges from 16° to 30°)
- N x VNI-CPLA for N x GEO S12 array
- Four 12mm diameter screws (*not provided*)

IMPORTANT

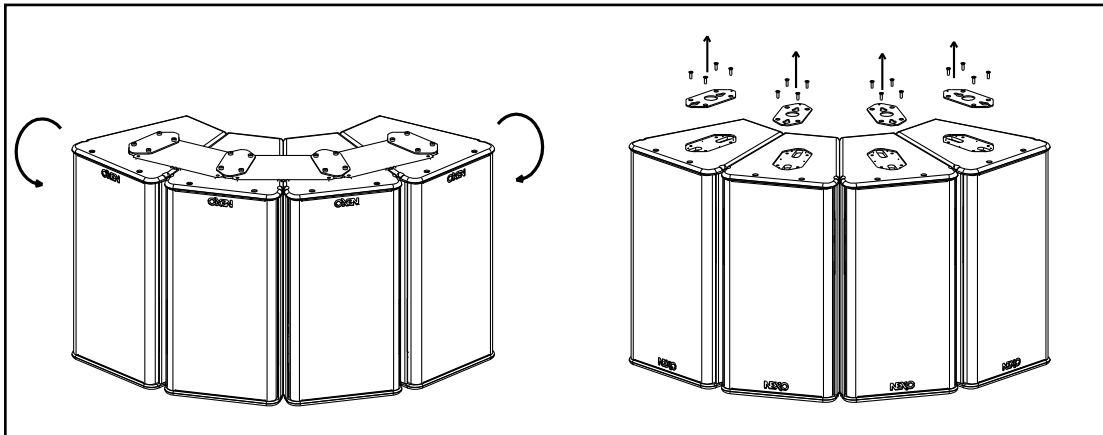
Ensure that the ceiling is strong enough to hold GEO S12 cluster weight and that the four screws 12mm diameter and corresponding plugs required to fix the “L” brackets under the ceiling are properly dimensioned.

Procedure

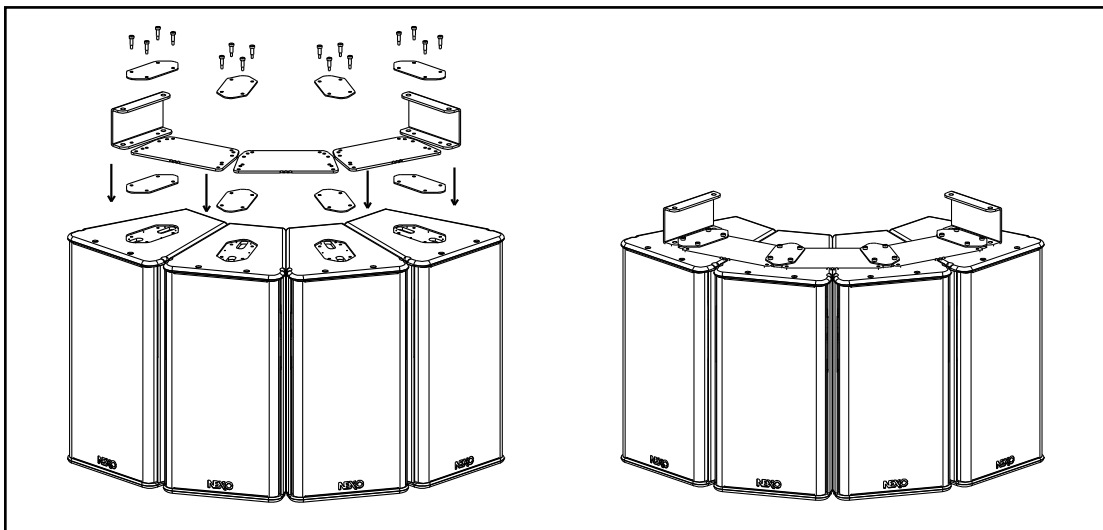
- (1) Set all GEO S12 side by side;
- (2) Remove the four TORX screws holding connector plates on upper side of all GEO S12's;
- (3) Remove the connector plates from all Geo S12's;
- (4) Position bottom external plates, angle plates and top external plate from VNI-ANPL and VNI-CPLA kits to required inter-cabinet angle value between cabinets upper sides;
- (5) Apply Loctite 243 or equivalent to shoulder screws from VNI-CPLA kits;
- (6) Screw all shoulder screws so that all plates and cabinets are tightened together;



- (7) Flip the cluster upside down to access connector plates located on the down side;
- (8) Repeat all above steps from #2 to #6;



- (9) Position the two “U” brackets from VNI-ABRK kits on the outer cabinets next the angle plates, and tight them to the cabinets using the shoulder screws provided with these kits (using Loctite 243 or equivalent);
- (10) Four screws 12mm diameter (not provided) are required to secure the “U” brackets under the ceiling;



8.3.8 GEO S12 horizontal array cable mounted on a ceiling

Required items

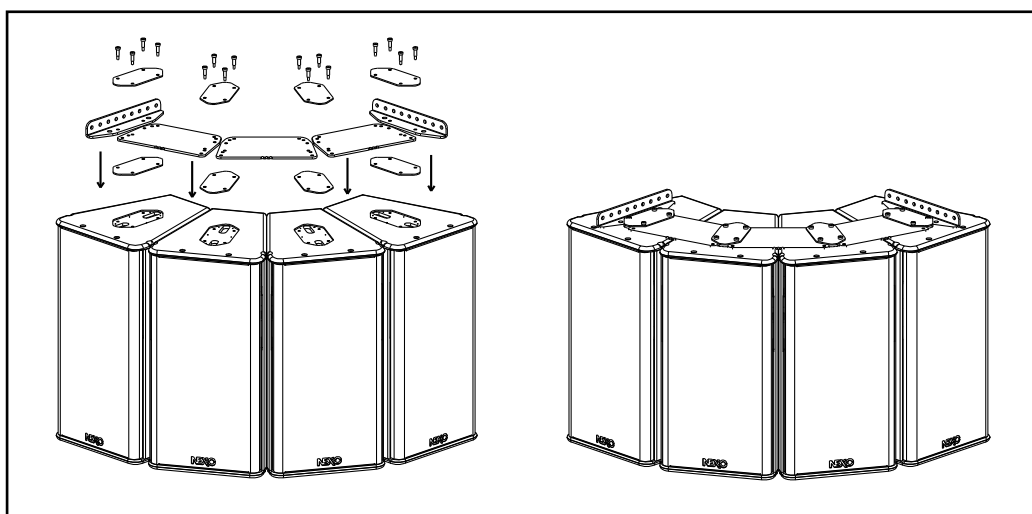
- 2 x VNI-LBRK (allows cable suspension for horizontal arrays, holes for cable suspension are 10mm diameter);
- (N-1) x VNI-ANPL for a N x GEO S12 array (ANPL1 ranges from 0.2° to 3.15°, ANPL2 ranges from 5° to 10°, ANPL3 ranges from 16° to 30°);
- N x VNI-CPLA for N x GEO S12 array;
- 4 slings and 4 shackles (not provided).

IMPORTANT

Ensure that the ceiling is strong enough to hold GEO S12 cluster weight and that the cables suspension system required fixing the cluster under the ceiling is properly dimensioned.

Procedure

- Proceed as in above section, VNI-LBRK being positioned on the outer cabinets instead of VNI-ABRK.
- 4 slings and 4 shackle (not provided) are required to secure the cluster under the ceiling;



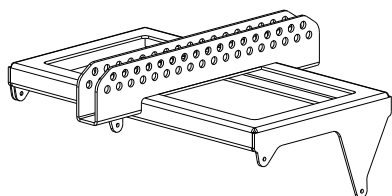
8.4 GEO S12 in touring applications

8.4.1 Touring Accessories

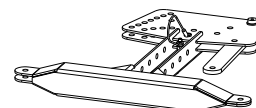
Accessories are :

- Bumper (GPT-BUMPER)
- Geo S12 Rigging Plates (GPT-XBOW)
- LS18 rigging plates (LST-XBOW)
- Tension Mode Link Bars for GPT-XBOW (GPT-TLB)
- Lifting Ring for GPT-SSBRK, GPT-PSBRK or VNT-TTC (VNT-XHBRK)
- Truss hook for GPT-SSBRK, GPT-PSBRK or VNT-TTC (VNT-TCBRK)
- “U” Bracket for single horizontal GEO S12 on pole stand, lifting ring or truss hook (GPT-SSBRK)
- U” Bracket for two horizontal GEO S12 on pole stand, lifting ring or truss hook (GPT-PSBRK)
- Flying Bar for single vertical GEO S12 (VNT-TTC)
- Ground Stacking device for up to 6 GEOS1210 (GPT-GSTK)

Please refer to section 13.3 of this manual for more information of above references.



GPT- BUMPER



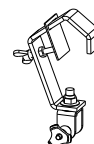
GPT-XBOW



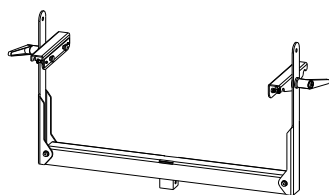
GPT-TLB



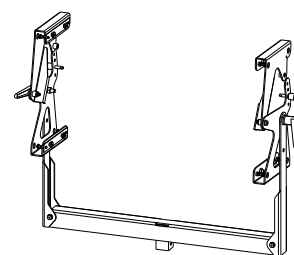
VNT-XHBRK



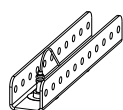
VNT-TCBRK



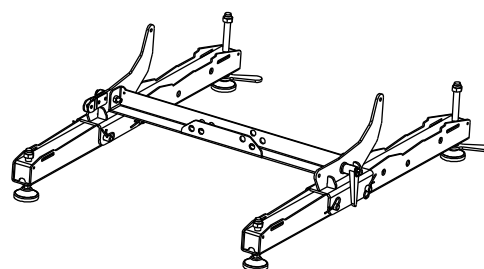
GPT-SSBRK



GPT-PSBRK



VNT-TTC



GPT-GSTK

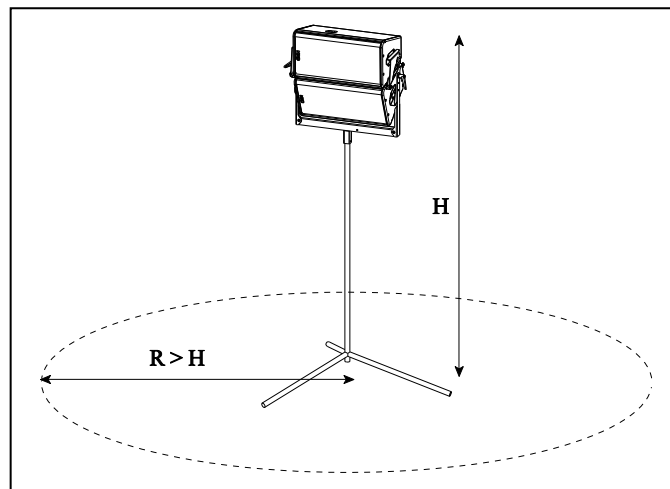
8.4.2 Single GEO S12 on speaker stand or on LS18 horizontally

Required items

- 1 x “U” Bracket for single horizontal GEO S12 (GPT-SSBRK);
- 1 x Speaker stand diameter 35mm (K&M 213 or equivalent);
- Or NEXO PS pole stand (VXT-PLSTD) for mounting on top of LS18

IMPORTANT (SPEAKER STAND)

- Speaker stand must be rated for assembly weight (40kg rated load min);
- Speaker stand must always be installed on a horizontal surface;
- Stand height and footprint must be defined to prevent assembly from collapsing;
- Ensure that public is not allowed within a safety area which radius is equal or higher than assembly height.



IMPORTANT (LS18 POLE STAND)

- NEXO PLSTD pole stand only should be used for mounting on top of NEXO LS18
- LS18 must always be installed on a horizontal surface;
- Ensure that public is not allowed within a safety area which radius is equal or higher than assembly height.

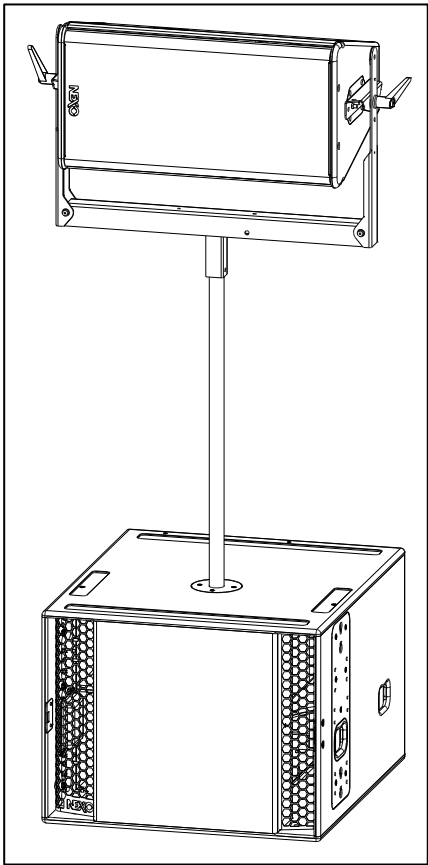
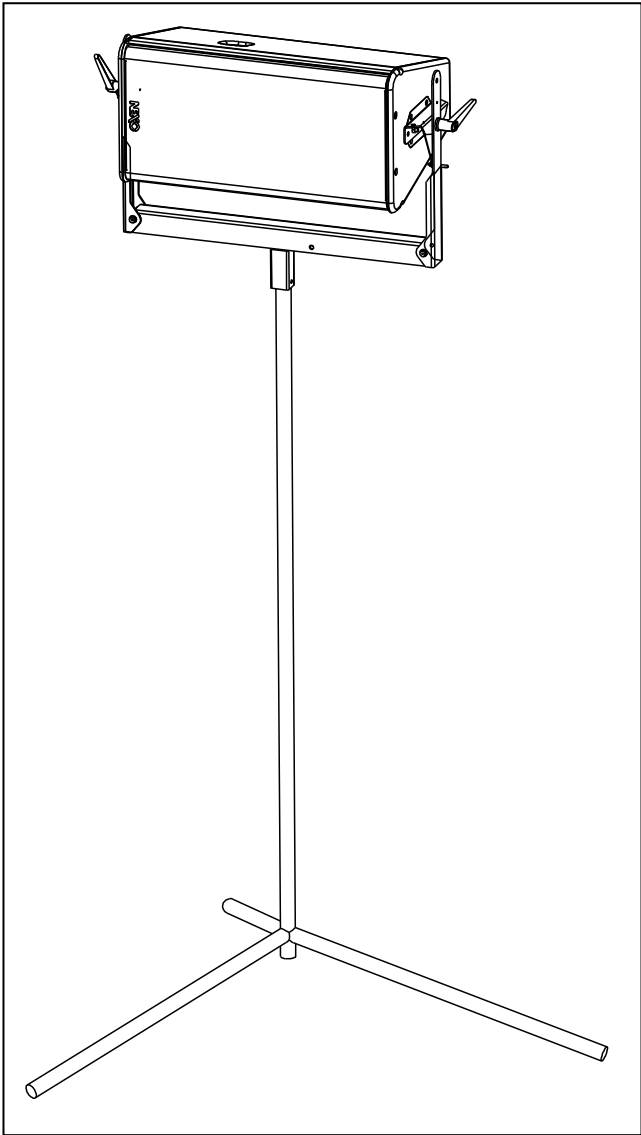
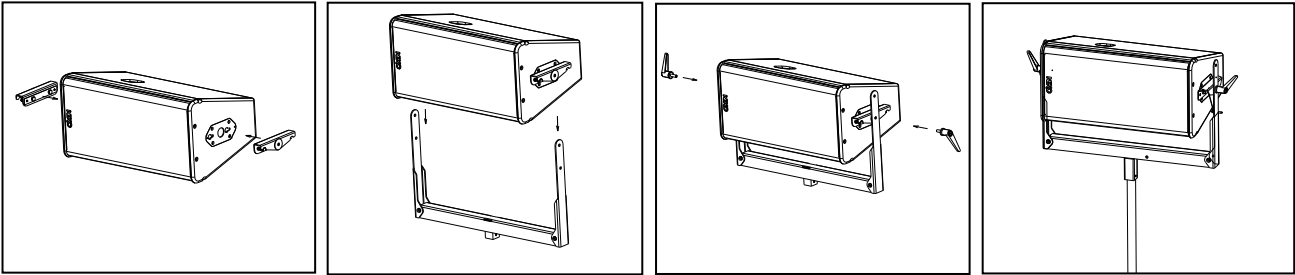
Procedure

- Slide GPT-SSBRK side plates into GEO S12 connecting plate oblong holes;
- Lock safety pins into GEO S12 connecting plate;

IMPORTANT

Ensure that safety pins are properly locked into GEO S12 connecting panels.

- Position “U” bracket over these side plates; align centre holes;
- Insert adjustment handles, adjust vertical angle and tight the handles to prevent GEO S12 from rotating around “U” bracket;
- Lift assembly on speaker stand or on LS18 with PLSTD pole stand.



8.4.3 Single GEO S12 flown vertically

Required items

- 1 x Flying Bar for single vertical GEO S12 (VNT-TTC)
- 1 x Lifting Ring (VNT-XHBRK)
- Or 1 x Truss hook (VNT-TCBRK)

IMPORTANT

Ensure that truss suspension point is strong enough to hold GEO S12 weight.

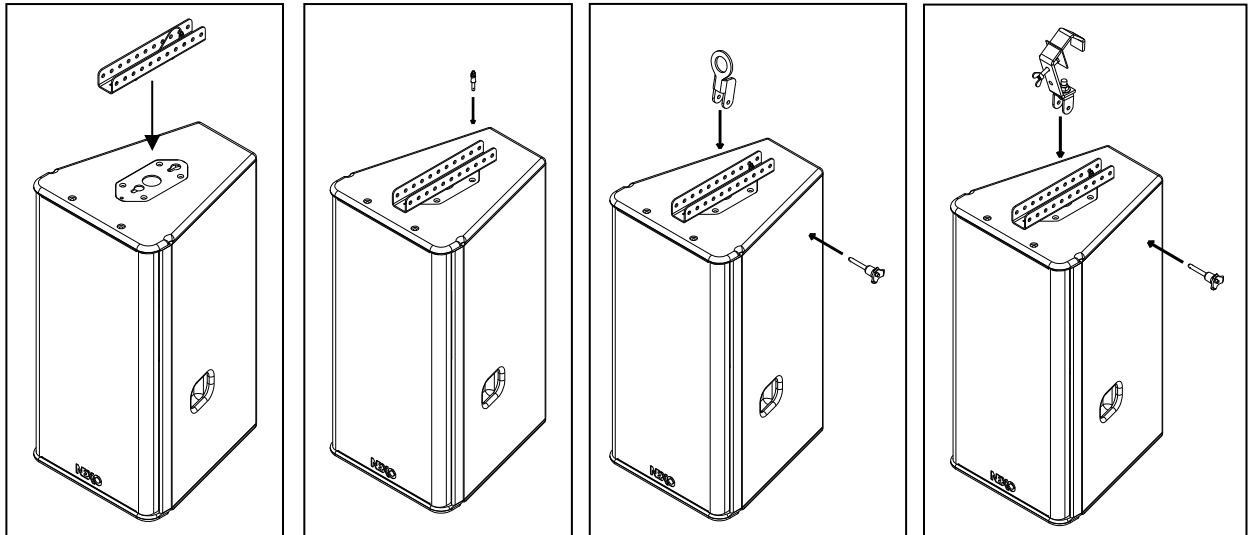
Procedure

- Slide flying bar VNT-TTC into GEO S12 connecting plate oblong holes;
- Lock safety pin into GEO S12 connecting plate;

IMPORTANT

Ensure that safety pin is properly locked into GEO S12 connecting panel.

- Cable suspension:
- Connect lifting ring VNT-XHBRK to flying bar by inserting 8x45 quick release pin in required holes for proper vertical aiming;
- Ensure lifting ring is properly locked to flying bar;
- Connect assembly to suspension point with sling and shackle (not provided).
- Truss suspension
- Connect truss hook VNT-TCBRK to flying bar by inserting 8x45 quick release pin in required holes for proper vertical aiming;
- Ensure truss hook is properly locked to flying bar;
- Lift and position assembly, lock hook on truss suspension point and secure with hook cable.



8.4.4 Single GEO S12 flown horizontally

Required items

- 1 x “U” Bracket for single horizontal GEO S12 (GPT-SSBRK)
- 1 x Lifting Ring (VNT-XHBRK)
- Or 1 x Truss hook (VNT-TCBRK)

IMPORTANT

Ensure that suspension point is strong enough to hold GEO S12 weight.

Procedure

- Slide GPT-SSBRK side plates into GEO S12 connecting plate oblong holes;
- Lock safety pins into GEO S12 connecting plate;

IMPORTANT

Ensure that safety pins are properly locked into GEO S12 connecting panels.

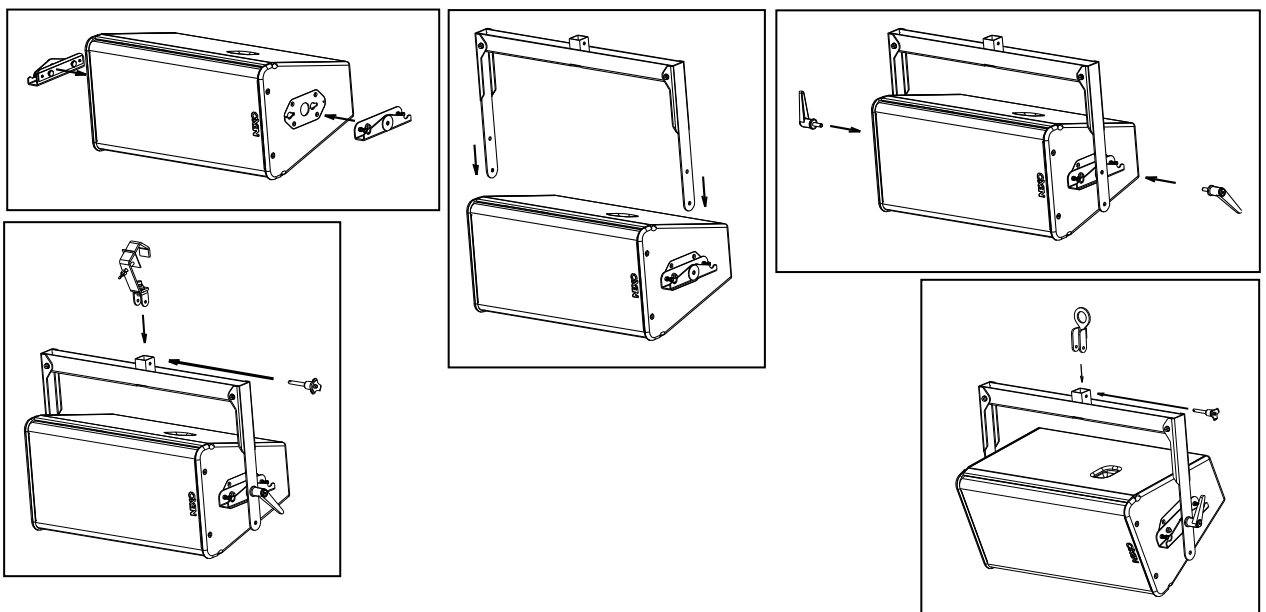
- Position “U” bracket over these side plates; align center holes;
- Insert adjustment handles, adjust vertical angle and tight the handles to prevent GEO S12 from rotating around “U” bracket;

Cable suspension:

- Connect lifting ring VNT-XHBRK to “U” bracket by inserting 8x45 quick release pin dedicated holes;
- Ensure lifting ring is properly locked to “U” bracket;
- Connect assembly to suspension point with sling and shackle (not provided).

Truss suspension

- Connect truss hook VNT-TCBRK to “U” bracket by inserting 8x45 quick release pin in dedicated holes;
- Ensure truss hook is properly locked to “U” bracket;
- Lift and position assembly, lock hook on truss suspension point and secure with hook cable.



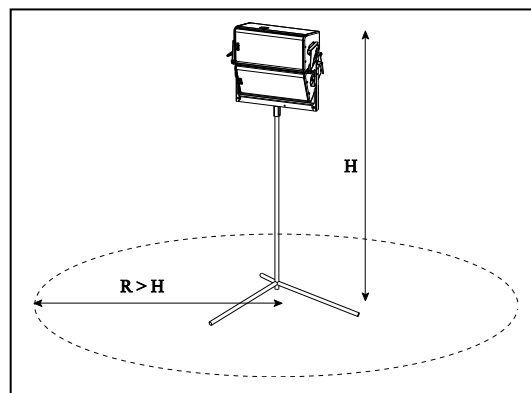
8.4.5 Two GEO S12 on wind-up stand

Required items

- 1 x U" Bracket for two GEO S12 (GPT-PSBRK)
- 1 x Wind Up stand diameter 35mm (Eurotruss ES160 or equivalent);

IMPORTANT (WIND UP STAND)

- Wind Up stand must be rated for assembly weight (80kg rated load min);
- Wind Up stand must always be installed on a horizontal surface;
- Stand height and footprint must be defined to prevent assembly from collapsing;
- Ensure that public is not allowed within a safety area which radius is equal or higher than assembly height.



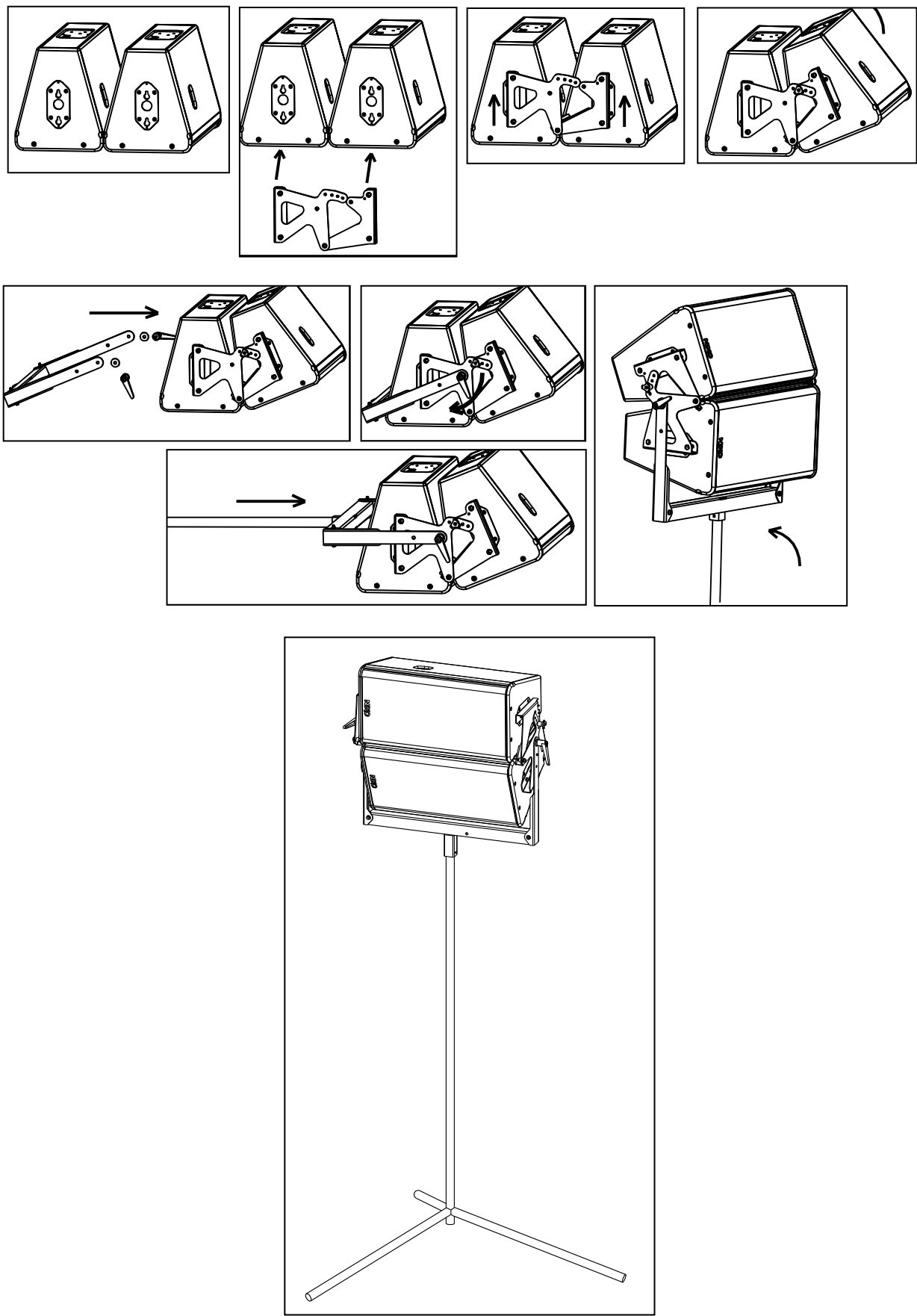
Procedure

- Set the 2 GEO S12 next to each other front grid to the floor
- Slide GPT-PSBRK side plates into GEO S12s connecting plate oblong holes;
- Lock safety pins into GEO S12s connecting plate;

IMPORTANT

Ensure that safety pins are properly locked into GEO S12s connecting panels.

- Adjust inter-cabinet angle and lock to required angle value with 8x20quick release pins;
- Position "U" bracket over these side plates; align centre holes;
- Insert adjustment handles, adjust vertical angle and tight the handles to prevent GEO S12s from rotating around "U" bracket;
- Lift assembly on Wind Up stand



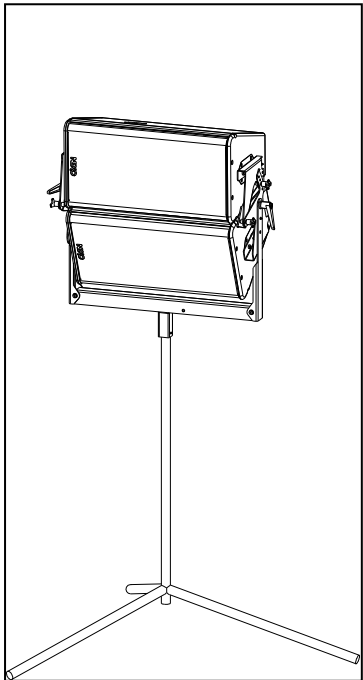
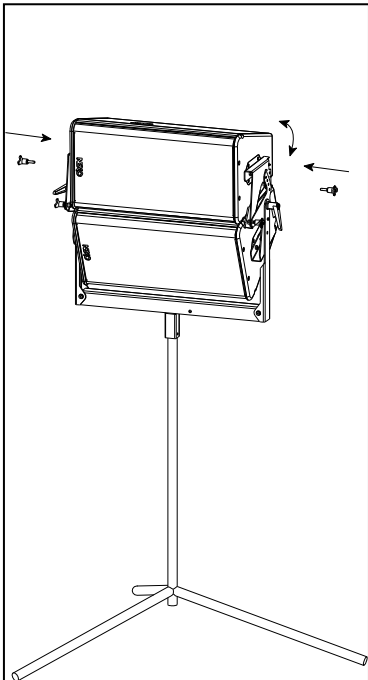
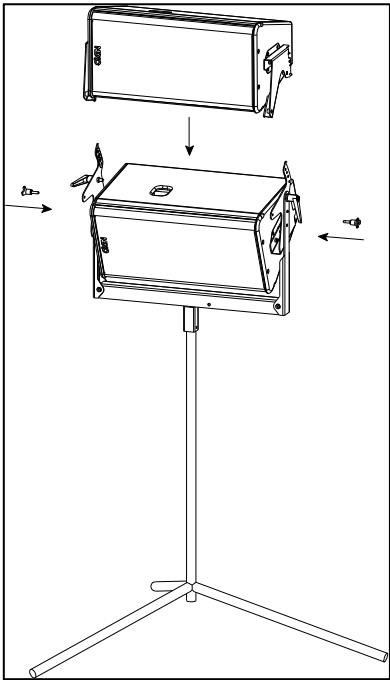
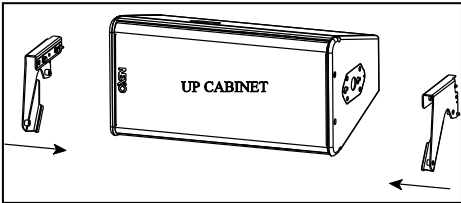
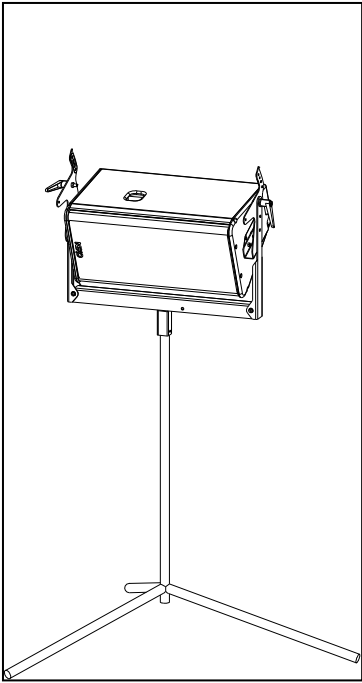
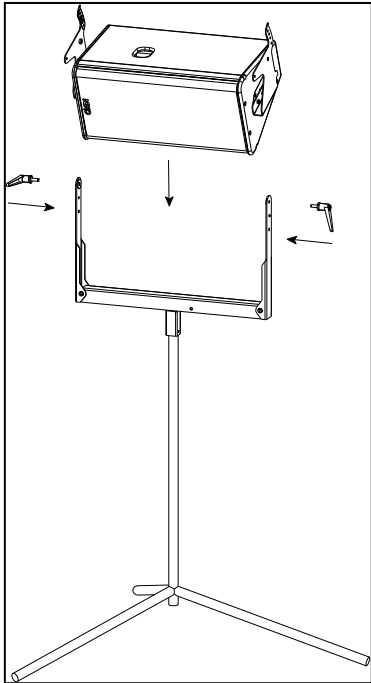
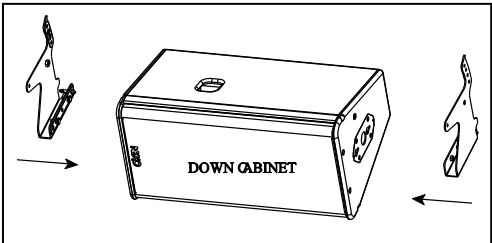
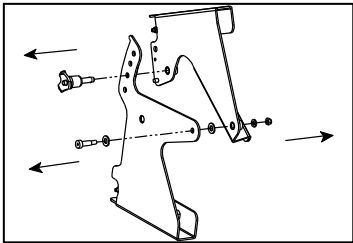
Alternative Procedure (“Walder” procedure)

Below described procedure required 2 additional 8x20 quick release pins (BLGEOS)

- Split the GPT-PSBRK side plates by removing screws and bolt;
- Slide GPT-PSBRK lower half-plates into lower GEO S12 connecting plate oblong holes;
- Lock safety pins into lower GEO S12 connecting plate;
- Position “U” bracket over these lower half plates; align centre holes;
- Insert adjustment handles, adjust vertical angle and tight the handles to prevent GEO S12 from rotating around “U” bracket;
- Lift assembly on Wind Up stand or on LS18 with PLSTD pole stand.
- Slide GPT-PSBRK upper half-plates into upper GEO S12 connecting plate oblong holes;
- Lock safety pins into upper GEO S12 connecting plate;
- Lift upper GEO S12 on top of lower one, and connect them together by inserting 8x20 quick release pins in articulation holes;
- Adjust inter-cabinet angle and lock to required angle value with quick release pins.

IMPORTANT

Ensure that safety pins are properly locked into GEO S12 connecting panels.



8.4.6 Two GEO S12 flown horizontally

Required items

- 1 x “U” Bracket for two GEO S12s (GPT-PSBRK)
- 1 x Lifting Ring (VNT-XHBRK)
- Or 1 x Truss hook (VNT-TCBRK)

IMPORTANT

Ensure that suspension point is strong enough to hold two GEO S12s weight.

Procedure

- Slide GPT-PSBRK side plates into GEO S12s connecting plate oblong holes;
- Lock safety pins into GEO S12s connecting plate;

IMPORTANT

Ensure that safety pins are properly locked into GEO S12s connecting panels.

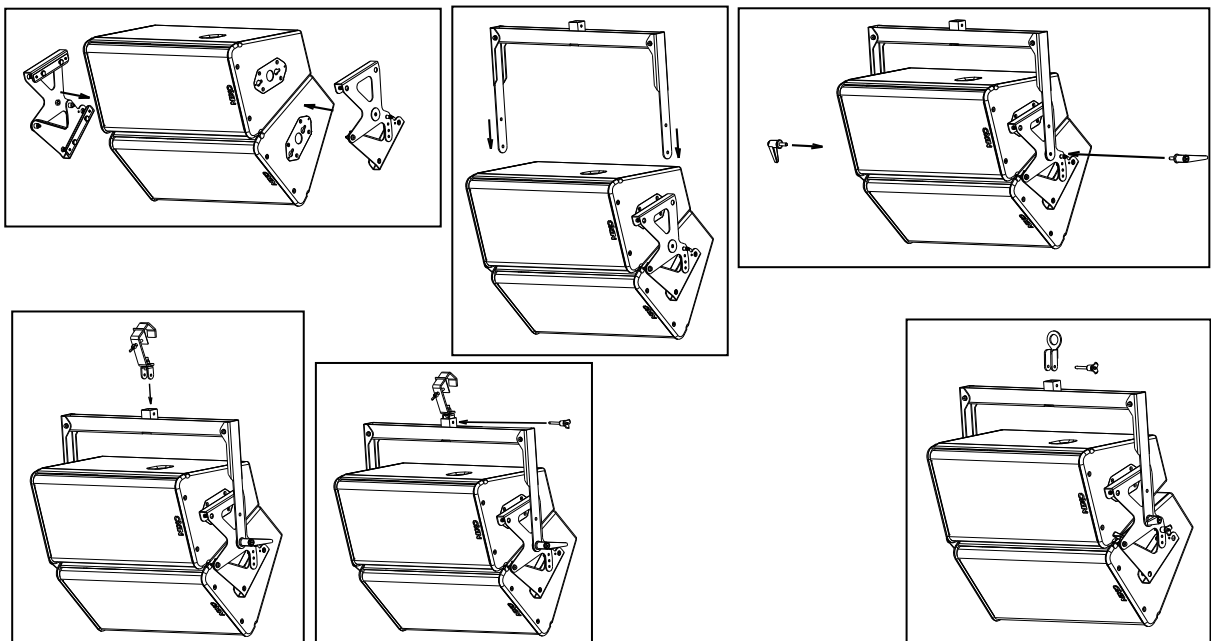
- Adjust inter-cabinet angle and lock to required angle value with 8x20 quick release pins;
- Position “U” bracket over these side plates; align centre holes;
- Insert adjustment handles, adjust vertical angle and tight the handles to prevent GEO S12s from rotating around “U” bracket;

Cable suspension:

- Connect lifting ring VNT-XHBRK to “U” bracket by inserting 8x45 quick release pin dedicated holes;
- Ensure lifting ring is properly locked to “U” bracket;
- Connect assembly to suspension point with sling and shackle (not provided).

Truss suspension

- Connect truss hook VNT-TCBRK to “U” bracket by inserting 8x45 quick release pin in dedicated holes;
- Ensure truss hook is properly locked to “U” bracket;
- Lift and position assembly, lock hook on truss suspension point and secure with hook cable.



8.4.7 Two or more GEO S12 flown vertically

Required items

- N Pair of Rigging Plates (GPT-XBOW) for N cabinets;
- 1 lifting ring (VNT-XHBRK) every two GEO S12;
- 4xN Quick release pins for N cabinets;
- Properly rated slings, shackles, hoists... (not provided)

IMPORTANT

Lifting ring VNT-XHBRK and truss hook VNT-TCBRK are rated for a maximum of 2 GEO S12s;

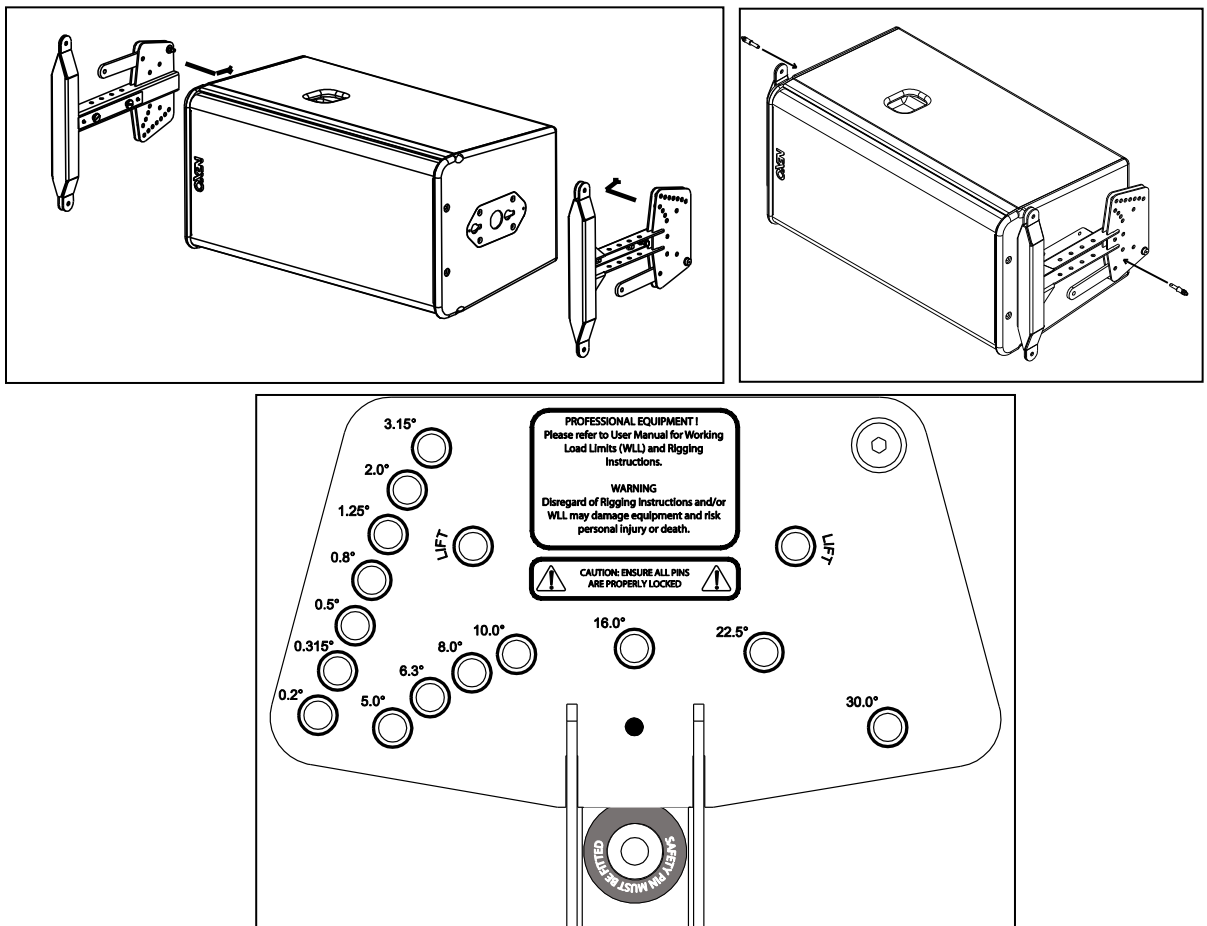
Ensure that suspension points are rated accordingly.

Procedure

- Insert GPT-XBOW into connecting plates of both sides of the cabinet;
- Lock safety pins into GEO S12s connecting plate;

IMPORTANT

Ensure that safety pins are properly locked into GEO S12s connecting panels.



IMPORTANT

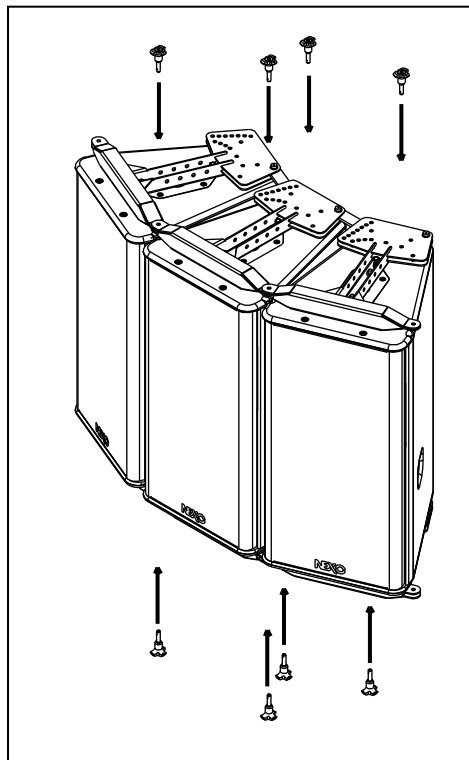
GEO S12 can be flown “Up” or “Down”:

- “Up” means Nexo logo on front grid is at the top;
- “Down” means Nexo logo on front grid is at the bottom.

GEO S12 can be connected “Up” or “Down” by simply flipping the cabinets.

Whenever possible, NEXO recommends symmetrical designs (ie Nexo logo in the same position on Left and Right clusters for stereo designs)

- Connect second Geo S12 with X-Bow front articulation holes and rear link bars and ensure quick release pins are properly locked;
- Repeat above steps for subsequent GEO S12's;

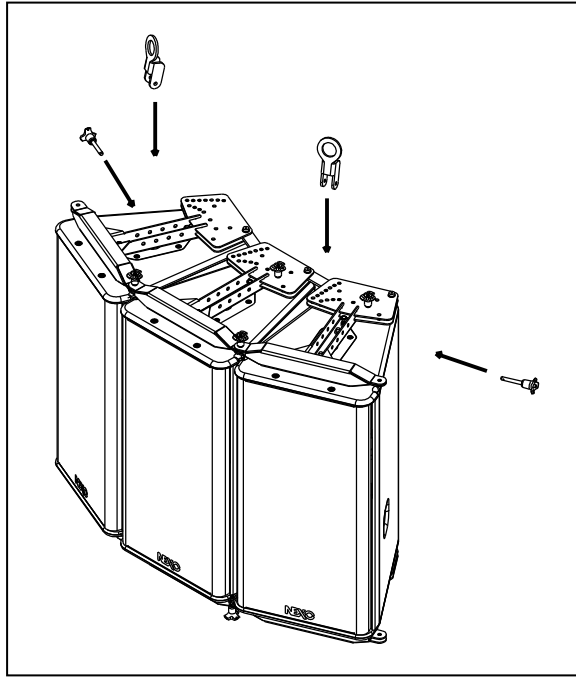
**IMPORTANT**

Ensure angle settings are identical on upper and lower side of the cabinets

Ensure that safety pins are properly locked into GEO S12s connecting panels.

Ensure that all quick release pins are properly locked into their position.

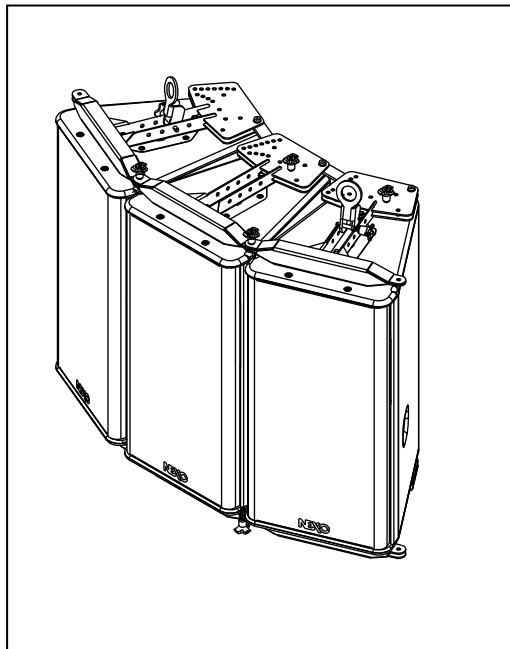
- Connect lifting rings to “U” bracket with 8x45 quick release pins supplied with VNT-XHBRK; ensure quick release pin is properly locked;



- Lift and position assembly, connect lifting rings to suspension points with sling and shackle;
- Secure assembly with secondary safety steel.

IMPORTANT

The requirements for secondary safety systems vary with territories. However, the secondary safety steel **MUST** have a SWL equivalent or greater than that of the rigging system.



8.4.8 LS18 and three or more GEO S12 flown horizontally

Required items

- 1 x Bumper (GPT-BUMPER);
- M pairs of LS rigging plates (LST-XBOW) for M x LS18 cabinets;
- N Pair of Rigging Plates (GPT-XBOW) for Geo S12 cabinets;
- 4x(N+M) Quick release pins for (N+M) cabinets;
- 1 hoist (not provided).

IMPORTANT

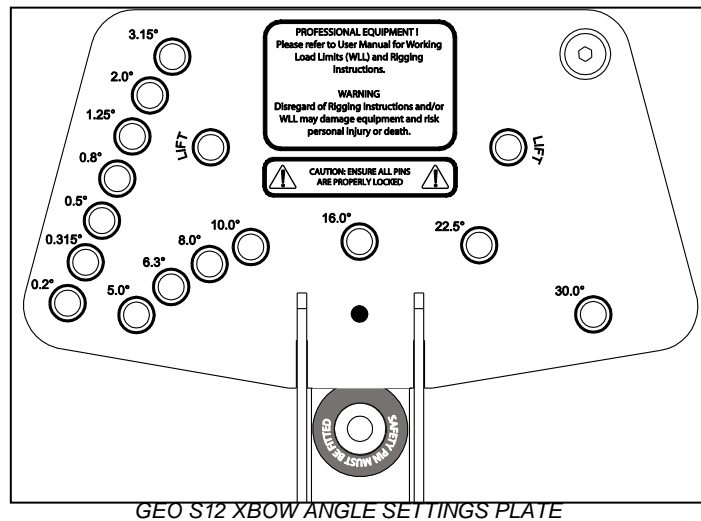
Maximum GEO S12 quantity for flown vertical cluster is 12 (and eventually less).

Maximum LS18 quantity for flown vertical cluster is 6 (and eventually less)

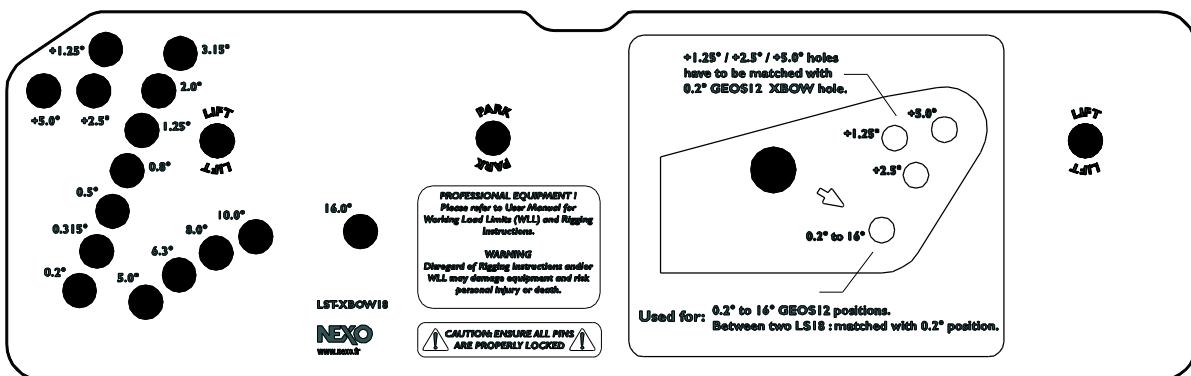
Please check NS1 for mechanical Safety Working Load computations.

IMPORTANT

Motor hoist must be rated to support entire cluster weight. Please check configuration in NS1 for proper motor hoist rating



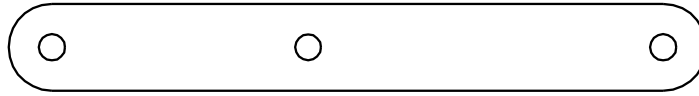
GEO S12 XBOW ANGLE SETTINGS PLATE



LS18 XBOW ANGLE SETTINGS PLATE

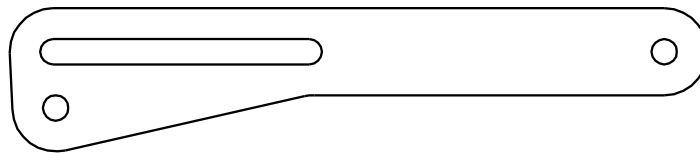
Optional GPT-TLB link bar for GPT- XBOW

GPT-XBOWs are delivered with standard link bars which allow both stacked and flown setups. However, these link bars require perfect alignment of angle setting holes when adding cabinets.



GPT-XBOW STANDARD LINK BAR

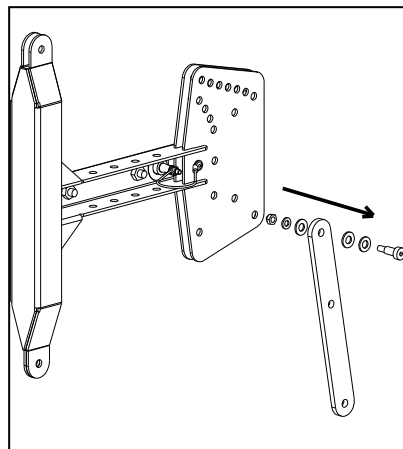
To facilitate flying operation, an optional link bar with oblong holes (GPT-TLB, pair of link bars provided with two 8x20 quick release pin) is available in the GEO S12 accessory range.



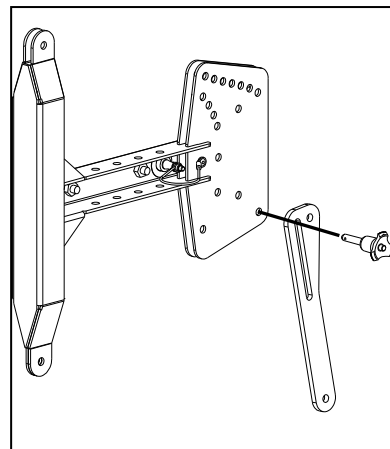
GPT- XBOW OPTIONAL GPT-TLB LINK BAR

To install GPT-TLB, remove the standard link as well as nut, screw and washers.

When using GPT-XBOW for flown setups, insert pins in the oblong hole and opposite circular hole.



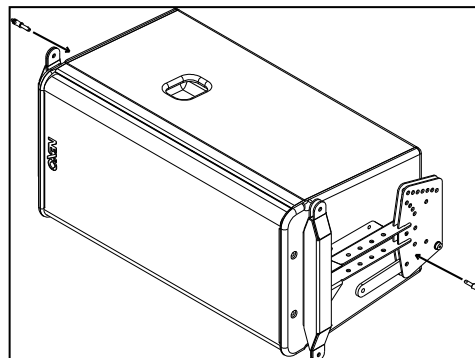
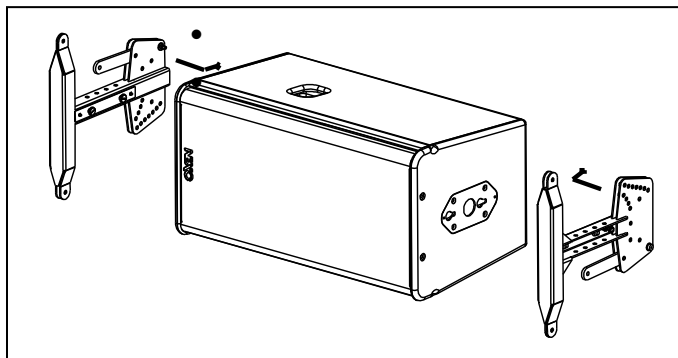
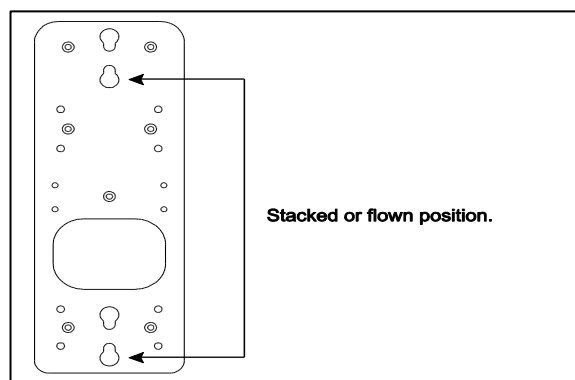
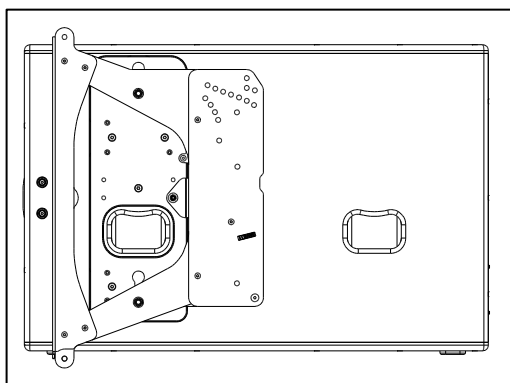
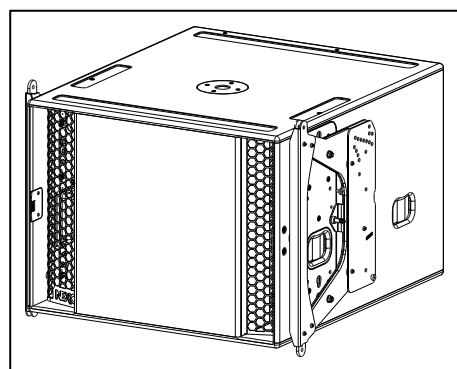
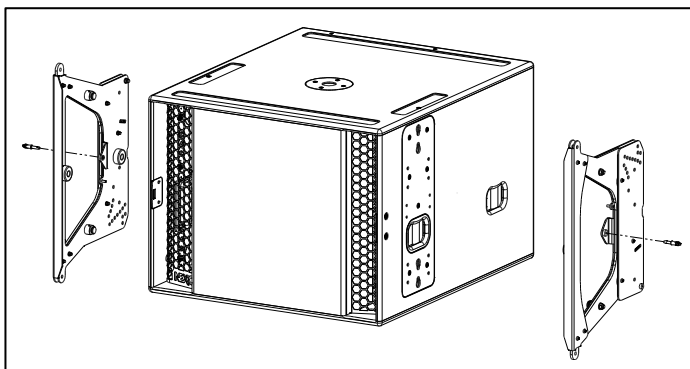
REMOVING STANDARD LINK BAR



INSERTING PIN - FLOWN SETUPS

Procedure

- Insert LST-XBOW into connecting plates of both sides of LS18s;
- Insert GPT-XBOW into connecting plates of both sides of GEO S12s;
- Lock safety pins into LS18 and GEO S12s connecting plate



IMPORTANT

Ensure that safety pins are properly locked into LS18s and GEO S12s connecting panels.

IMPORTANT

GEO S12 can be flown “Left” or “Right” :

- “Left” means Nexo logo on front grid is left as seen from front;
- “Right” means Nexo logo on front grid is right as seen from front.

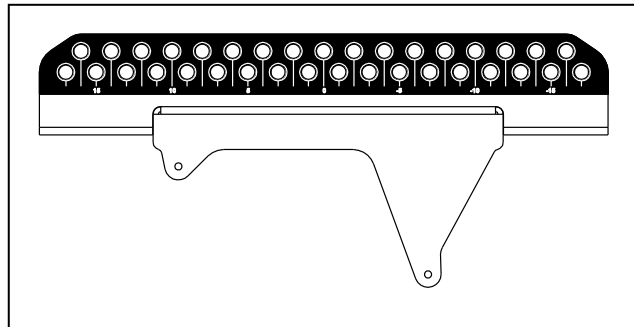
GEO S12 can be connected to bumper “Left” or “Right” by simply flipping the cabinets. Whenever possible, NEXO recommends symmetrical designs (preferably NEXO logo outwards in stereo configurations)

LS18s are always flown upwards (ie with NEXO logo properly oriented and pole stand hole up)

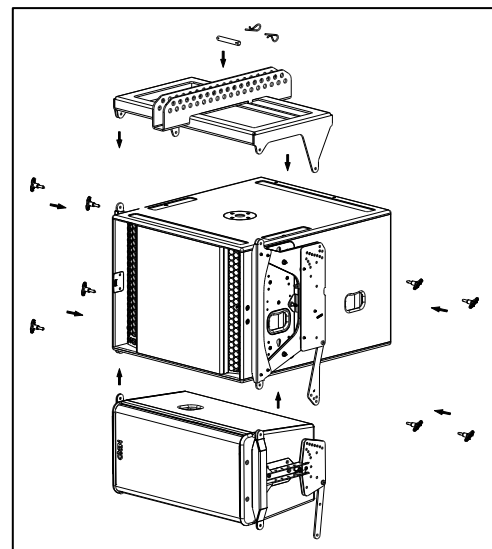
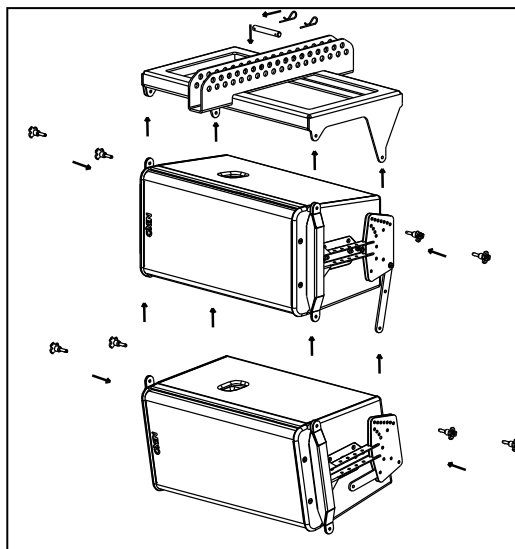
- Connect bumper to first LS18 or GEO S12 using “lift” points of XBOWs; ensure quick release pins are properly locked;
- Insert axis in bumper NS-1 predefined hole and secure it with provided “R” clip;

NB: Bumper holes are numbered #-17 to #17, please refer to NS-1 to determine axis position in relation to bumper angle requirements.

If bumper is flown with 2 hoists, then they should be connected to holes #-17 and #17.



- Connect hoist hook to bumper axis and lift assembly to sufficient height in order to connect a second LS18 or GEO S12;
- Connect second LS18 or Geo S12 with X-Bow front articulation holes and rear link bars and ensure quick release pins are properly locked;
- Repeat above steps for subsequent cabinets.



IMPORTANT

Ensure angle settings are identical on both sides of the cabinets.

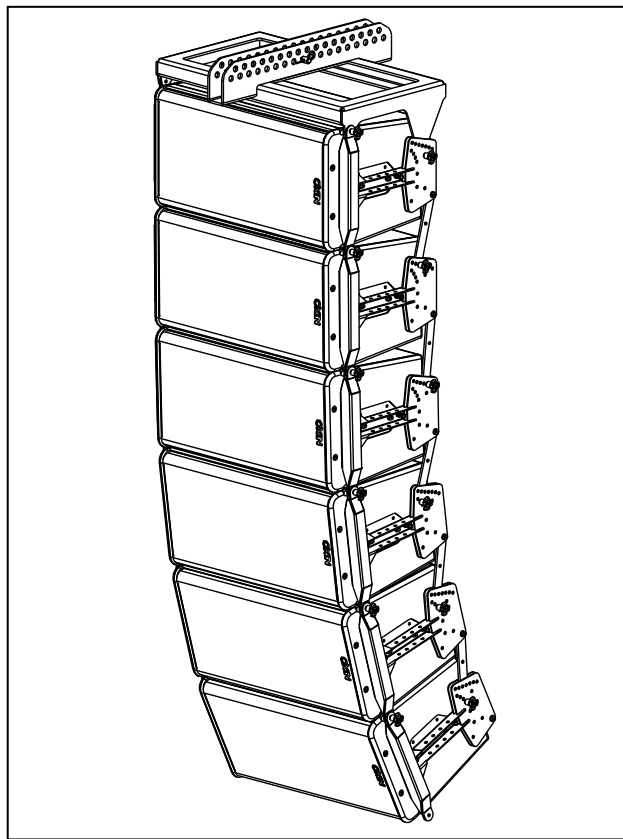
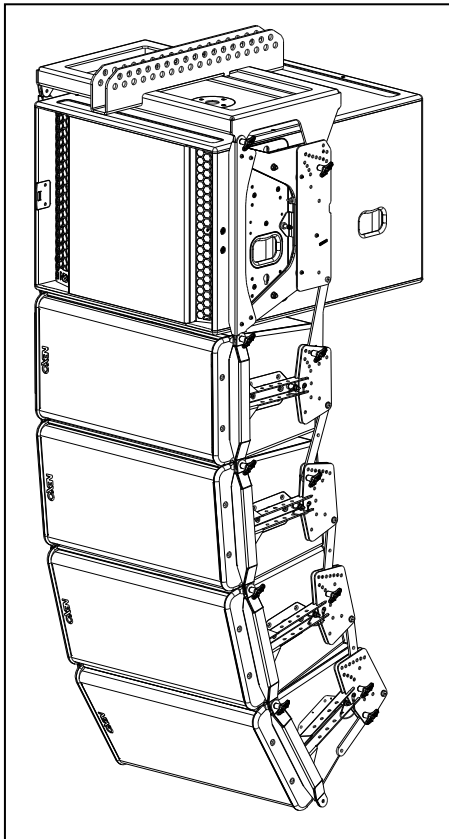
Ensure that safety pins are properly locked into LS18s and GEO S12s connecting panels.

Ensure that all quick release pins are properly locked into their position.

- Lift cluster to NS-1 defined rigging height, secure cluster horizontally to prevent it from rotating;
- Secure bumper with secondary safety steel.

IMPORTANT

The requirements for secondary safety systems vary with territories. However, the secondary safety steel **MUST** have a SWL equivalent or greater than that of the rigging system.



8.4.9 Ground stacked LS18 and GEO S1210

Required items

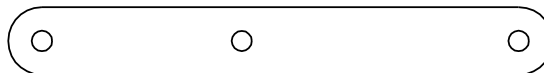
- M pairs of rigging plates (LST-XBOW) for M x LS18
- N Pairs of Rigging Plates (GPT-XBOW) for N x GEO S12;
- 1 ground stack device (GPT-GSTK);
- 4xN Quick release pins for N cabinets;

IMPORTANT

- Ground stack device GPT-GSTK is rated for a **maximum of:**
6xGEO S1210s or 2xLS18s + 4xGEO S1210s or 4xLS18s
in any inter cabinet angle configuration, provided this device is assembled according to below rules.
- Ground stack device GPT-GSTK must always be installed on a horizontal surface;
- Bottom GEO S12 tilt angle must be limited to $\pm 10^\circ$
- Ensure that public is not allowed within a safety area which radius is equal or higher than assembly height.
- It is highly recommended to secure the system to a fix point located at the back of the stack.

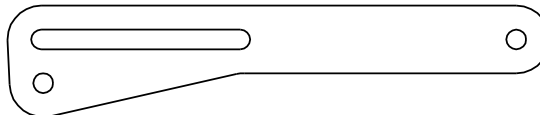
Optional GPT-TLB link bar for GPT-XBOW

GPT-XBOWs are delivered with standard link bars which allow both stacked and flown setups. However, these link bars require perfect alignment of angle setting holes when adding cabinets.



GPT- XBOW STANDARD LINK BAR

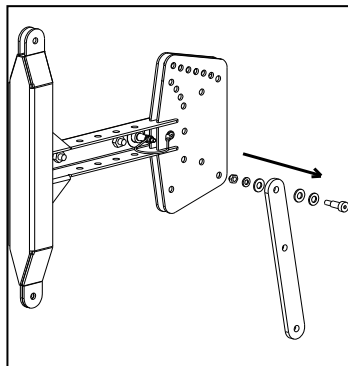
To facilitate flying and stacked operation, an optional link bar with oblong holes (GEOS12-TLB, pair of link bars provided with two 8x20 quick release pin) is available in the GEO S12 accessory range.



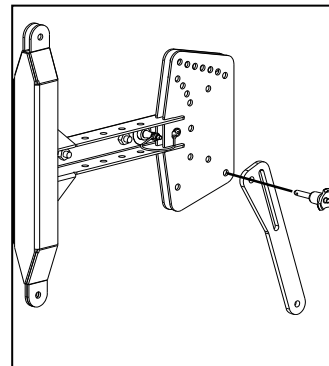
GPT-XBOW OPTIONAL GPT-TLB LINK BAR

To install GPT-TLB, remove the standard link as well as nut, screw and washers.

When using GPT-XBOW for stacked setups, insert pins in the two circular holes.



REMOVING STANDARD LINK BAR



INSERTING PINS - STACKED SETUPS

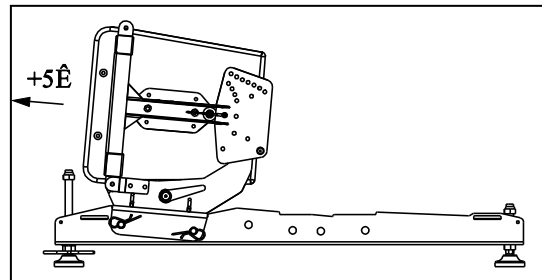
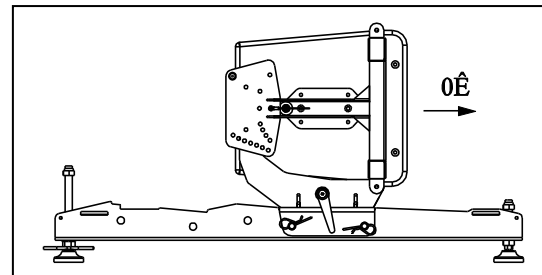
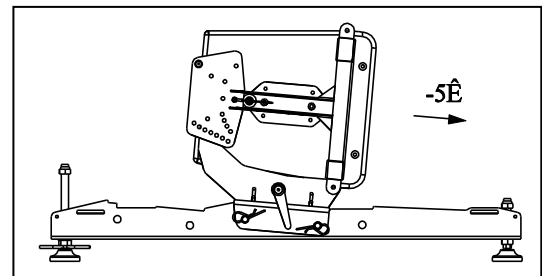
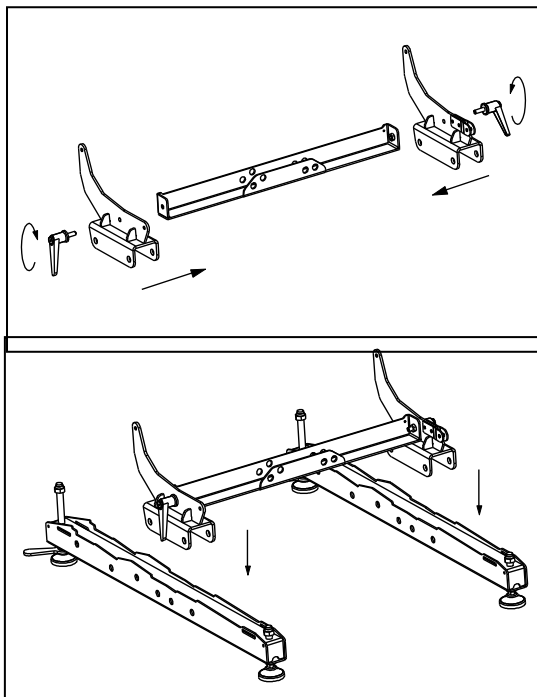
LS18 and GEO S12 ground stack device description

GPT-GSTK ground stack device includes:

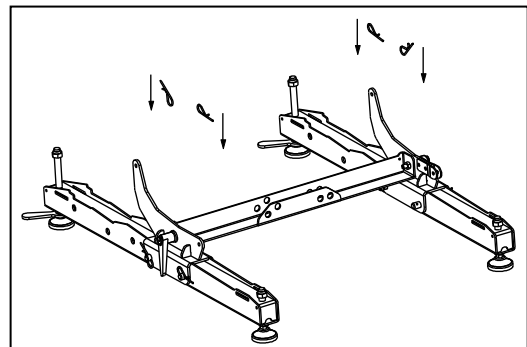
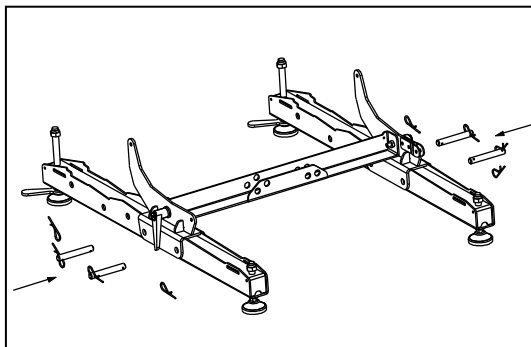
- two supporting beams, which support assembly weight;
- two connecting beam, which allow connection of the beams to the first cabinet;
- one reinforcement beam, to rigidify ground stack device sideways;
- Axis, "R" clips and handles to assemble the ground stack device

Procedure

- Assemble the two connecting beam and the reinforcement beam with the handles;
- Depending on tilt angle – negative, null or positive - to be achieved, there are three positions to connect above assembly to the supporting beams; below drawings detail these configurations:



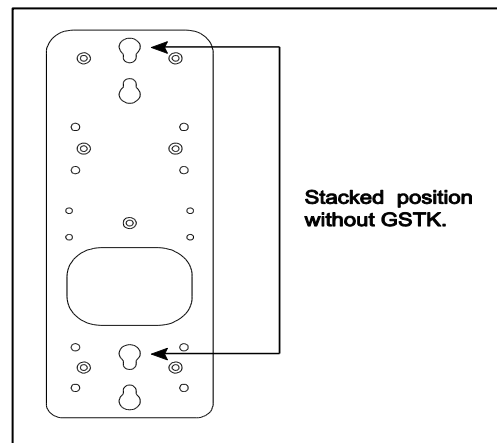
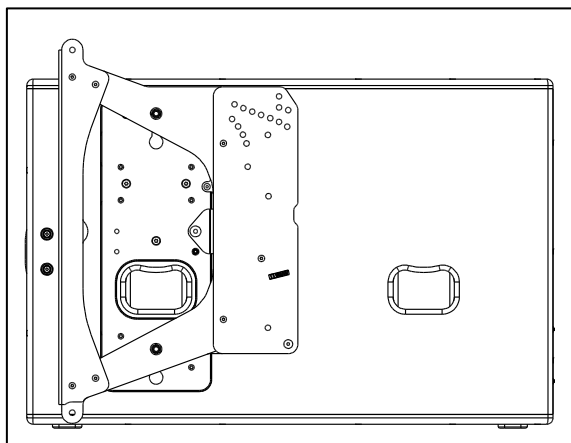
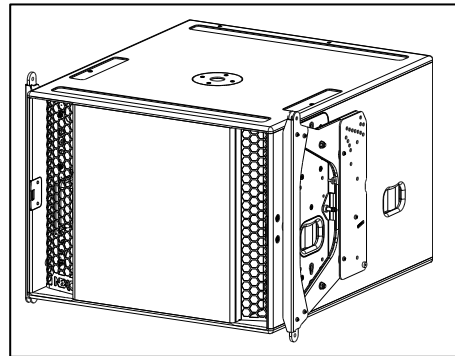
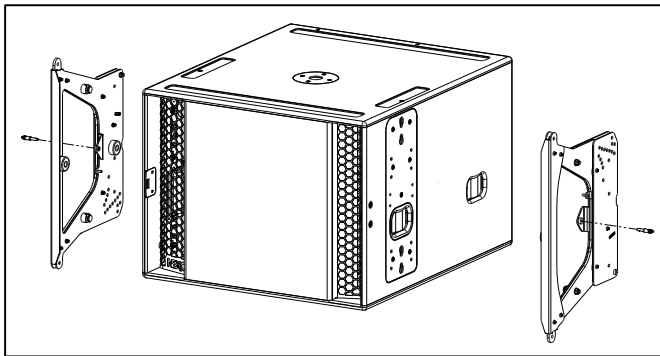
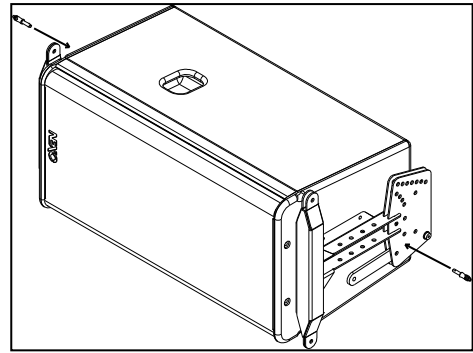
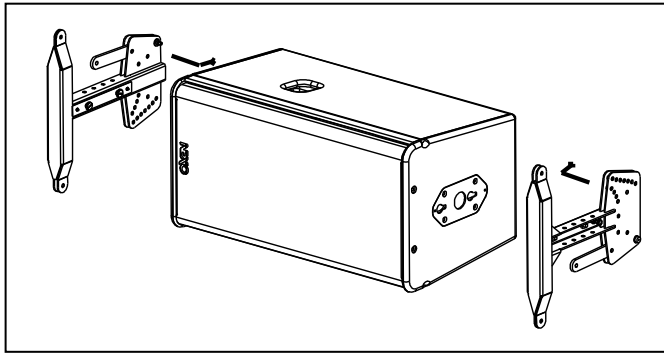
- Connect the reinforcement bar to the supporting beams according to required tilt angle configuration using 2 axis per side; secure the axis with provided "R" clips;



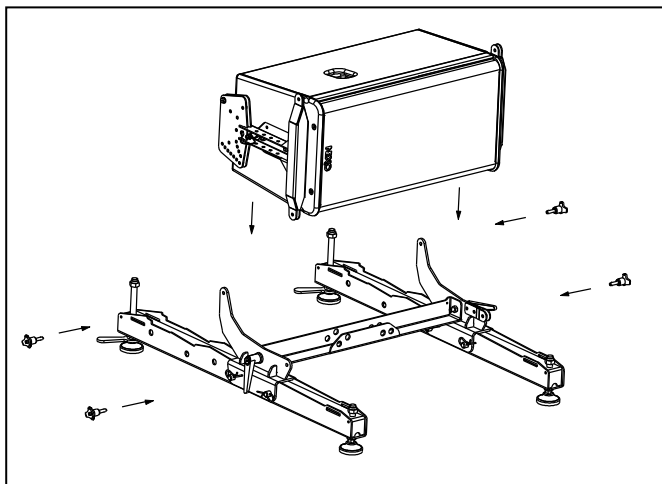
- Insert GPT-XBOW into connecting plates of both sides GEO S12s;
- Insert LST-XBOW into connecting plates of LS18s
- Lock safety pins into LS18s and GEO S12s connecting plate;

IMPORTANT

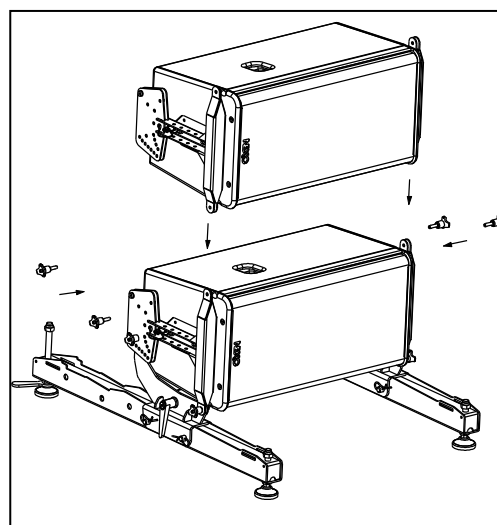
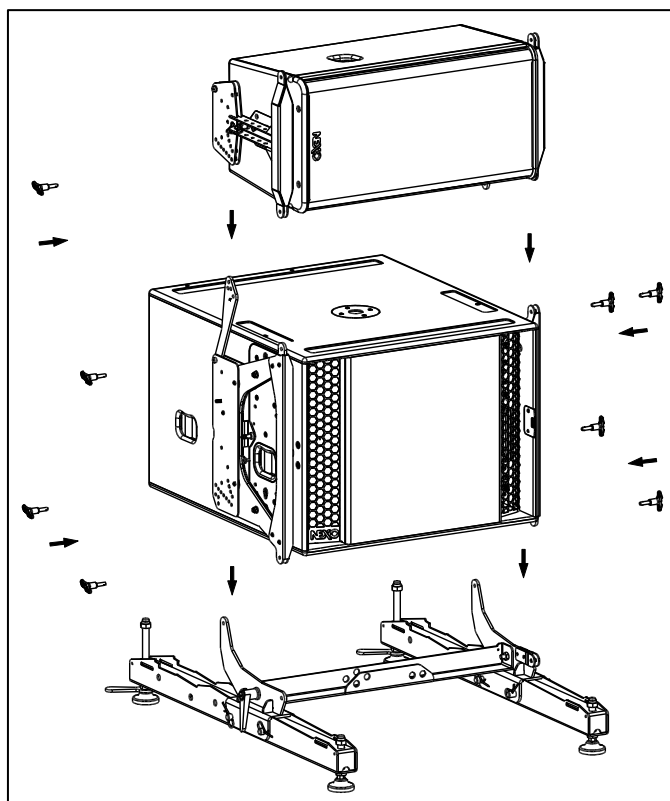
Ensure that safety pins are properly locked into LS18s and GEO S12s connecting panels.



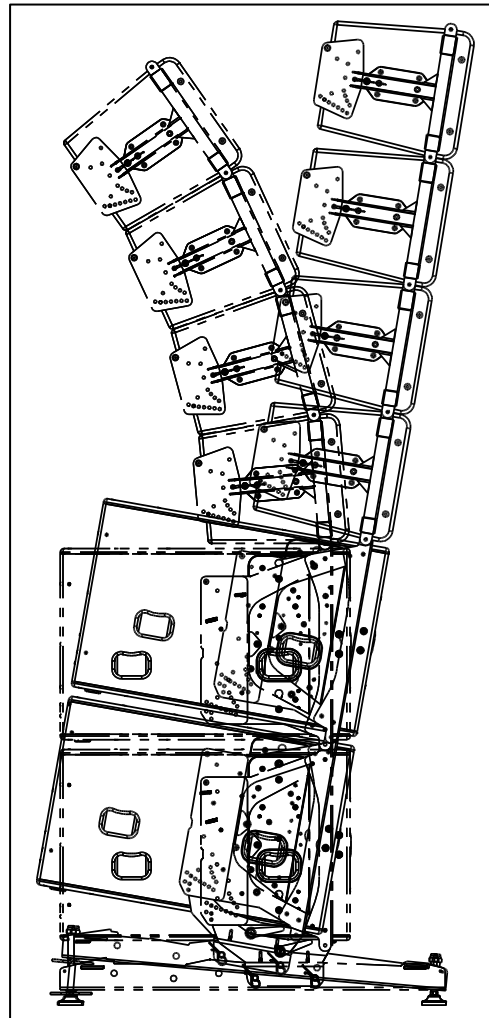
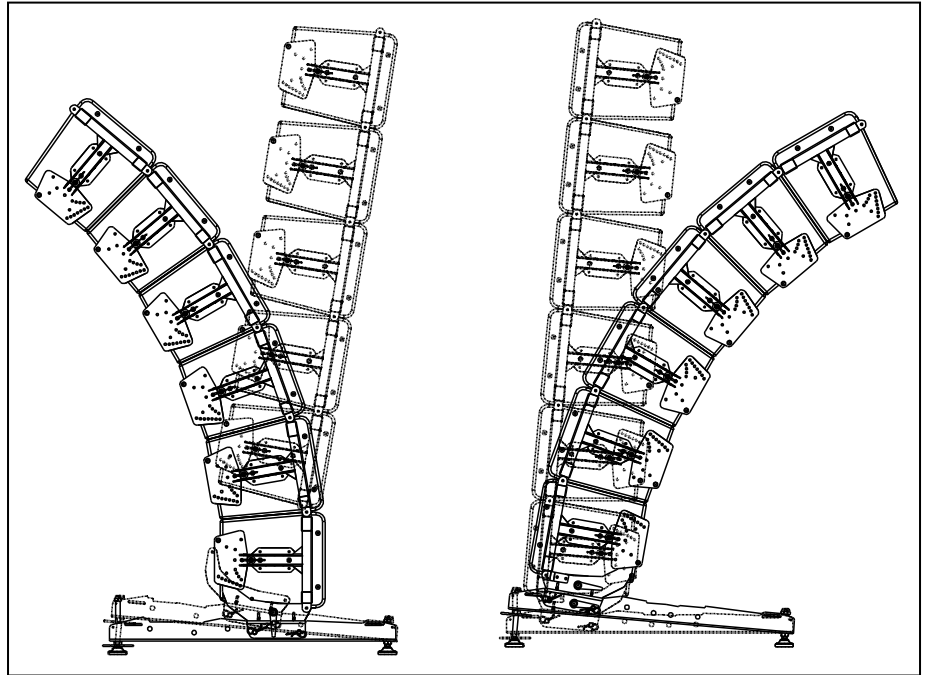
- Connect bottom LS18 or GEO S12 to GPT-GSTK Ground stacking device with 4 8x20 quick release pins;



- Connect second LS18 or Geo S12 with X-Bow front articulation holes and rear link bars and ensure quick release pins are properly locked;
- Repeat above steps for subsequent cabinets



- Once the assembly is completed, rotate rear or front GEO S12 ground stack device adjustable legs to definitive tilt angle, ensuring that $\pm 10^\circ$ is never exceeded on bottom GEO S12.



8.5 Testing and Maintenance of the system

- General: Geo is a precision piece of equipment and requires regular attention to maintenance in order to give long and reliable service. NEXO recommends regular testing of loudspeaker rigging components, preferably using a suitable test rig coupled with a visual inspection.
- Fasteners: there are several critical points in the LS18GEO S12 cabinets.
- Of primary concern are:
 - a) The grid screws attaching the grid to the cabinet
 - b) The machine screws attaching the connecting plates to the cabinet.
 - c) The screws attaching the directivity flanges to the front of the cabinet.
- These fasteners should be regularly checked and tightened as necessary.
- Cleaning: The exterior of the cabinet and the rigging system can be cleaned with a damp cloth soaked in mild soapy water. On no account use solvent based cleaners , which may damage the finish of the cabinet
- After cleaning, the rigging system must be treated with a suitable lubricant to prevent rusting. NEXO recommends the use of Scottoil FS365 which is a water-based lubricant with a mixture of machine oil, surfactant and anti-rust treatment.

9 SYSTEM ALIGNMENT GUIDELINES

The NX242's factory delay presets are optimised to provide the best possible crossover between the GEO S12 and CD18 / S2 / GEO SUB systems. The reference point for this adjustment is the front of each cabinet. (This means that the internal delays needed to achieve a correct time alignment are set for cabinets standing next to each other with both fronts aligned). We recommend that the system is adjusted so that arrivals from GEO S12 and CD18 / S2 / GEO SUB are coincident at a fairly distant listening position.

9.1 GEO S12 Vertical Cluster design

Cluster design must be done with NS-1 (previously Geosoft2), which provides very intuitive and fast method to determine all cluster geometry parameters in relation to venue where cluster is implemented.

NS-1 is a freeware available for all Nexo users. Please contact your local distributor for licensing procedure.

IMPORTANT

Never install a GEO S12 cluster without checking its acoustical performances and mechanical safety in NS-1 prior to installation.

Please contact your local distributor for assistance and/or training NS-1

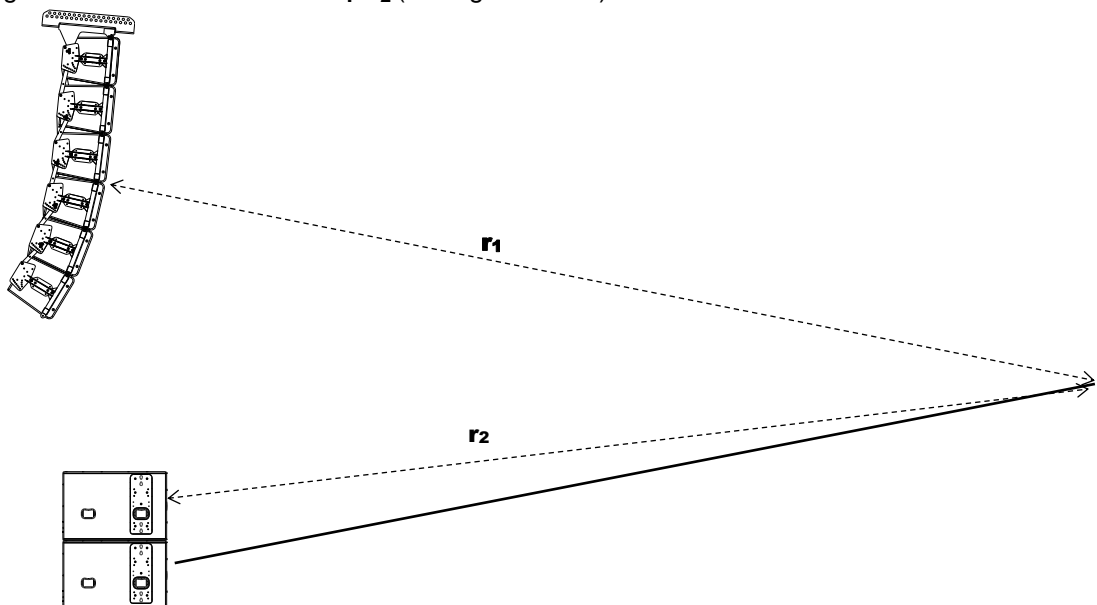
9.2 Stacked LS18s and Flown GEO S12

Recommended NX242 GEOS12 setup family: X-OVER

In the example below, r_1 being the distance from GEO S12 array to listener position, and r_2 being the distance from GEO SUB to listener position, the distance difference is then $r_1 - r_2$ (specified meters or feet).

- $r_1 > r_2$, the delay should be set on the LS18 NXAMP TDcontroller channel.
- $r_1 < r_2$, the delay should be set on the GEO S12 NXAMP TDcontroller channel
- To convert the result in time delay (specified in seconds), apply:
- $\Delta t = (r_1 - r_2) / C$ and r_2 in meters, C (sound speed) ≈ 343 m/S.

Set the units to meters, feet or seconds according to your preference). Delay will have to be adjusted according to the distance difference $r_1 - r_2$ (see figure below).



9.3 Driving the LS18s from the AUX send

It is quite common to use the AUX send of a mixing desk to drive the Sub section of a PA system. This gives the mixing engineer more flexibility to set the level of the subbass relative to the main PA, apply special effects, or to use a different EQ on the Sub. However, it also raises some serious issues for the performance & safety of the system (mostly time alignment).

At NEXO, great care is taken to design optimum phase alignment from one octave above to one octave below the crossover frequency point. By doing so, drivers are working perfectly together and providing the best efficiency possible. It is then up to the user to adjust the delay on the NX242 to match the physical path difference of the different systems. It is thus possible to get a well adjusted system, even without measuring instruments.

If LS18s are driven from an AUX output, NXAMPs are fed with two signals coming from different sources. If those two sources (MAIN output & AUX send) are not exactly in phase, delay is introduced into the crossover between the GEO S12 array and the LS18s. It is then mandatory to use proper measurement tool to optimize phase response.

Why is it unlikely that AUX and MAIN outputs have the same phase?

- Signal paths are likely to be different; any filter modifying the bandwidth and EQ of the signal is also affecting the phase.

Example: a 24dB/oct high pass filter set at 15Hz is affecting amplitude of the signal by only 0.6dB at 30Hz, but the phase shift is 90°!! At 100Hz we can still measure 25° of phase shift.

- Limiting bandwidth with a low pass filter can introduce a phase difference of up to 180° (completely out of phase) at the cross over point.
- If the signal is passing through any digital equipment, between 1.4ms and 2.2ms is being added (around 70° phase shift at 100Hz) due solely to the converter delay! The additional delay due to the processing itself (look ahead compressor, delay...) can be quite important as well.

If both outputs are not measured in the actual configuration, it is very likely that phase alignment will not be correct.

Consequences of badly aligned systems

Mis-aligned systems have lower efficiency: i. e. for the same SPL the system will have to be driven harder, activating the displacement & temperature protection at lower output levels. Both sound quality and reliability will decrease as the system is stressed.

Precautions & Checks

Before using the AUX of a mixing desk, ensure that MAIN and AUX outputs are in phase;

Always apply identical EQ or processing on both channels, so that the phase relationship will not be altered;

Never add additional low pass filtering on the SUB or high pass filtering on the main system;

Inverting polarity on one channel should always result in a massive difference near the crossover point. If that is not the case, the system is no longer aligned.

9.4 **Recommended installation tools and equipment**

- Tape measure – should be 30m/100ft in length and be of durable fibre material. Have one per array available to speed up the installation process.
- Laser Inclinator – For measuring vertical and horizontal angles in the venue. An ideal product is the Calpac 'Laser projecting a dot' version which costs approximately 60 €.
- Spirit level – used to ascertain the trueness of the surface from which the angle measurements originate.
- Rangefinder measuring device – either a Disto type laser measure or an optical laser rangefinder can be used. Devices such as the Bushnell 'Yardage Pro' sports rangefinders provide sufficiently accuracy and are easy to use. They have the additional advantage of working very well in bright sunlight.
- Electronic calculator with trigonometric functions to calculate the height from ground level to points in the room. The formula to calculate height of a point from measured angle and distance is:
 - Height of point = $\sin(\text{vertical angle in degrees}) \times \text{distance to point}$
 - NB: Take care when using spreadsheets as they calculate using radians by default. To convert degrees to radians use the formula:
 - Angle (in radians) = $3.142 \times \text{Angle (in degrees)} / 180$
- Computer – Laptop or Desktop PC running Windows XP with the current version of NEXO NS-1 installed. It is not possible to configure a Geo tangent array properly without using NS-1. Note that, when NS-1 designs are prepared prior to arrival at the venue, it is often necessary to modify or update the design to accommodate special circumstances. A PC is absolutely essential to make such changes.
- Audio Analysis Software – recommended but not absolutely essential, programs such as Easera Systune, Smaart, WinMLS enable rapid and detailed analysis of the installation. Consider taking a training course in using one of these tools if you are not already competent with them – it will pay dividends in increased performance of the system.

10 GEO S12 – LS18s SYSTEM CHECK LIST

It is essential to execute all these check steps prior to perform a sound check on the “front end” to the system. Following this checklist step by step will prevent many troubles and will save time in the end.

10.1 Are the speakers properly connected and angled ?

- Attach the first series of modules to the bumper.
- Before flying, verify that all channels of all modules are functioning properly.
- To check that all elements have the proper amplitude and phase, you should listen to the upper boxes at a close distance (<1 meter). You should be able to move from the top to the bottom of the cluster without hearing any change in the tonal balance.
- Verify that the angle settings are the same on both sides of each module.
- Raise the bumper, attach the next series of modules and repeat the above checks.
- Make sure that these series of modules sum properly with the modules above them.
- When all the modules are flown, check that the aiming angles are the same left and right.
- Make sure that multiple GEO S12 and LS18 are summing properly: 6 dB gain per doubling of quantity.

10.2 Final Pre-Sound Check Check

Play a CD track mono left, and then right: both sides must sound strictly identical. When listening in the centre between Left and Right GEO S12's, everything from LF to HF should be located to the “phantom centre” position. If not, repeat the above check sequence to identify the source of the problem.

11 TECHNICAL SPECIFICATIONS

11.1 LS18 Subwoofer

11.1.1 System specifications

SYSTEM SPECIFICATIONS		LS18 with NXAMP TD Controller
Frequency Response [a]		35 Hz - 120 Hz ± 3 dB
Usable Range @ -6dB [a]		32Hz - 130 Hz
Sensitivity 1W @ 1m [b]		107 dB SPL Nominal
Nominal Peak SPL @ 1m [b]		137 to 140 dB Peak
Nominal Impedance		8 Ω
Crossover Frequencies		60 Hz – 85 Hz - 120 Hz Active
Amplified Controller		NXAMP4x1: 2 x LS18 in parallel on 2 bridged channels NXAMP4x4: 2 x LS18 on 1 channel
SYSTEM OPERATION		
Electronic Controller		The NEXO NXAMP presets are precisely matched to the LS series cabinets and include sophisticated protection algorithms. Using LS Series cabinets without a properly connected NXAMP will result in poor quality and can damage components
Speaker Cables		LS18 is wired 1- & 1+ on 2 In/Out Speakon connectors Single cables can thus be used to loop through to PS15-R2 or to Geo S12.
PRODUCT FEATURES		LS18 (LS18e)
Components:		1 x 18" (46cm) 4" voice coil long excursion 8 Ω driver
Height x Width x Depth		510 x 675 x 775 mm (20.1" x 26.1" x 30.5")
Weight : Net		55.5 kg excluding accessories (122.3 lb)
Connectors		2 x NL4MP Speakon 4 pole
Construction		Baltic Birch Ply & structured black coating
Fittings: Handles		4 metal recessed pockets (None)
Front finish		Molded Dark Grey Metal Grill
Flying Points		Two side plates connecting with external accessories (None)
Stand fittings		Internal Steel Stand Fitting on Top (35mm, 1"3/8) allows pole mounting for PS15 or Geo S12 (None)

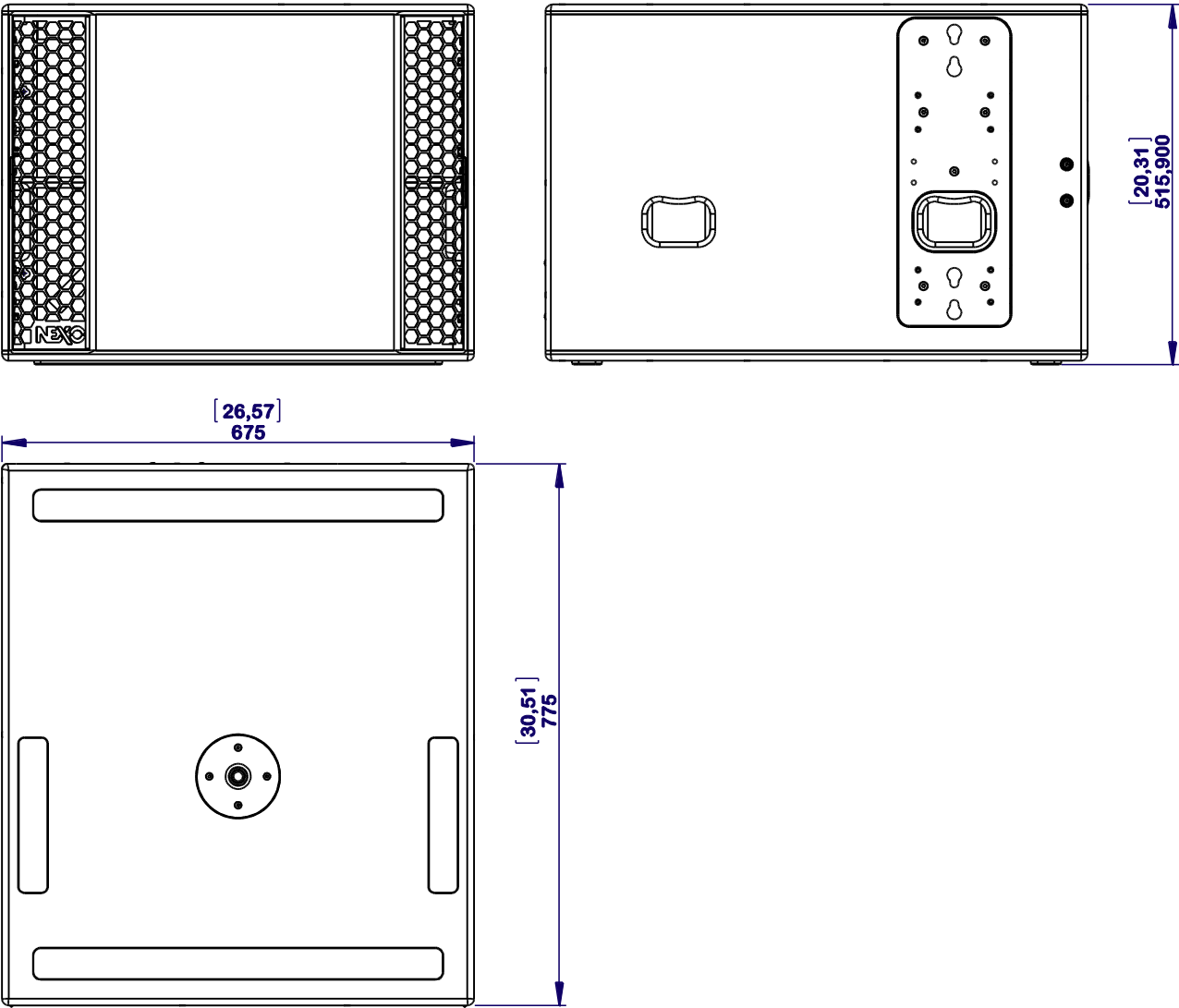
As part of a policy of continual improvement, NEXO reserves the right to change specifications without notice.

[a] Response curves & data : Half-Space Anechoic radiation for the LS18 + NXAMP.

[b] Sensitivity & Peak SPL data : these will depend on spectral distribution and crest factor of program material. Measured with band limited Pink Noise., Wideband to the specified ± 3 dB range. Data are for speaker + processor + recommended amplifier combinations. Peak SPL is at clipping of recommended amplifier.

[c] Directivity curves & data : obtained by computer treatment on off axis response curves.

11.1.2 Dimensions



11.2 GEO S1230 Module

11.2.1 System specifications

PRODUCT FEATURES		GEO S1230
Components		HF: 1 x 3" voice coil, 1.4" throat 16 Ohms driver on a 5" hyperboloid reflective wavesource. LF: 1 x 12" (30cm) high excursion neodymium 16 Ohm driver.
Height x Width x Depth		344 x 675 x 400 mm (13 ^{1/2"} x 26 ^{1/2"} x 15 ^{1/2"}) excluding accessories Rigging axis to axis height: 345mm (13 ^{1/2"})
Shape		30° Trapezoid.
Weight: net		26.8 kg (59.1 lbs) excluding accessories.
Connectors		2 x NL4MP SPEAKON 4 pole (In & Through)
Construction		Baltic birch ply with structured black coating.
Front finish		Molded Dark Grey Metal Grill.
Flying points		Two plates connecting with external accessories. Intercabinet angle adjustments = (16°) - 22.5° - 30°
SYSTEM SPECIFICATIONS		GEO S1230 with NX242 TDcontroller & NX-tension Card
Frequency response [a]		53 Hz – 19 kHz ± 3 dB
Usable range @ -6dB [a]		50 Hz – 20 kHz
Sensitivity 1W @ 1m [b]		103 dB SPL nominal
Peak SPL @ 1m [b]		131 to 133dB Peak (for 500 to 900 W RMS Amplifier)
Dispersion [c]		Coupling Plane: 28.5°. Non-Coupling Plane: Configurable 80° / 120°.
Crossover frequencies		LF-HF: 1.1 kHz Passive or Active (internally configurable)
Nominal impedance		HF: 16 Ohms; LF : 16 Ohms;
Recommended amplifiers 3 GEO S1230 in Parallel		HF: 875 to 1550 Watts into 4 Ohms LF: 1750 to 3100 Watts into 4 Ohms
	4 GEO S1230 in parallel	HF: 1000 to 1800 Watts into 4 Ohms LF: 2000 to 3600 Watts into 4 Ohms
	6 GEO S1230 in parallel	HF: 1650 to 3000 Watts into 2 Ohms LF: 3300 to 6000 Watts into 2 Ohms
SYSTEM OPERATION		
Electronic controller		The NEXO TDcontrollers presets are precisely matched to the GEO S12 Series cabinets and include sophisticated protection. Using GEO S12 Series cabinets without a properly connected NEXO TDcontrollers will result in poor sound quality and can damage components.
Sub-bass		CD18 / GEO SUB / S2 extend system low frequency response down to 32 Hz / 38 Hz / 32 Hz
Speaker cables		Active:; 1/1*:LF; 2/2*: HF Passive: 1/1*: Not Connected; 2/2*:LF + HF.
Accessories		Please refer to the GEO S12 user manual before any operation.

As part of a policy of continual improvement, NEXO reserves the right to change specifications without notice.

[a] Response curves and data: anechoic far field above 200 Hz, half-space anechoic below 200 Hz.

[b] Sensitivity & peak SPL: will depend on spectral distribution. Measured with band limited pink noise.

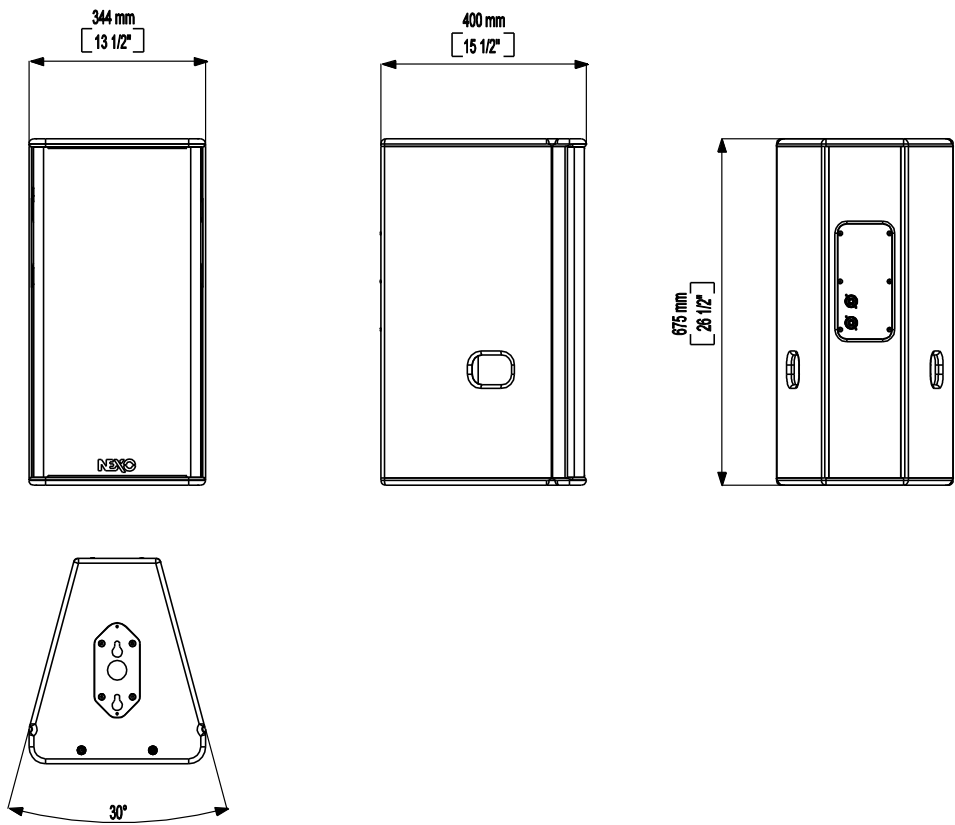
Refers to the specified +/- 3 dB range. Data are for speaker + processor + recommended amplifier combinations.

[c] Directivity curves and data: 1/3 octave smoothed frequency response, normalized to on-axis response. Data obtained by computer processing of off-axis response curves.

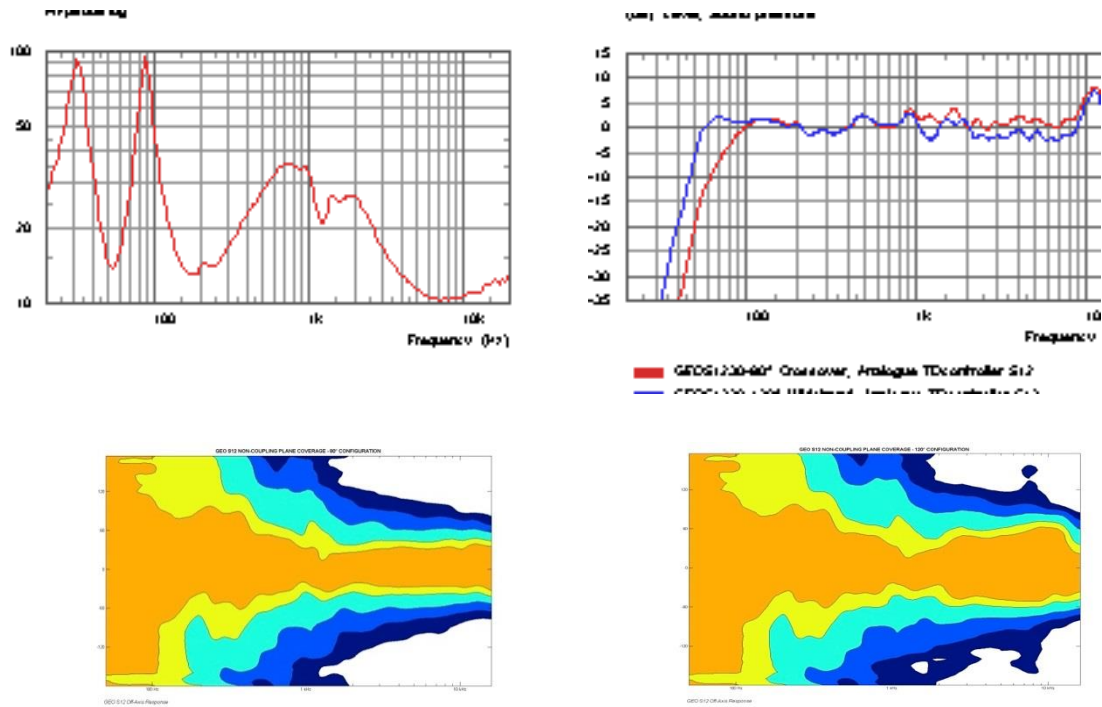
[d] Please refer to the GEO S12 user Manual.

Usable range data: frequency response capability with TD crossover slopes removed.

11.2.2 Dimensions



11.2.3 Diagrams



11.3 GEO S1210 Module

11.3.1 System specifications

PRODUCT FEATURES		GEO S1210
Components		HF: 1 x 3" voice coil, 1.4" throat 16 Ohms driver on a 5" hyperboloid reflective wavesource. LF: 1 x 12" (30cm) high excursion neodymium 16 Ohm driver.
Height x Width x Depth		344 x 675 x 378 mm ($13\frac{1}{2}" \times 26\frac{1}{2}" \times 14\frac{1}{8}"$) excluding accessories Rigging axis to axis height: 345mm ($13\frac{1}{2}"$)
Shape		10° Trapezoid.
Weight: net		28.05 kg (61.8 lbs) including array assembly system.
Connectors		2 x NL4MP SPEAKON 4 pole (In & Through)
Construction		Baltic birch ply with structured black coating.
Front finish		Molded Dark Grey Metal Grill.
Flying points		Two plates connecting with external accessories. Intercabinet angle adjustments = 0.2°, 0.315°, 0.5°, 0.8°, 1.25°, 2.0°, 3.15°, 5°, 6.3°, 8.0°, 10.0° (logarithmic steps)
SYSTEM SPECIFICATIONS		GEO S1210 with NX242 TDcontroller & NX-tension Card
Frequency response [a]		53 Hz – 19 kHz \pm 3 dB
Usable range @ -6dB [a]		50 Hz – 20 kHz
Sensitivity 1W @ 1m [b]		103 dB SPL nominal
Peak SPL @ 1m [b]		Configuration Dependent [d]
Dispersion [c]		Coupling Plane: Configuration dependent [d] Non-Coupling Plane: Configurable 80° / 120°.
Crossover frequencies		LF-HF: 1.1 kHz Passive or Active (internally configurable)
Nominal impedance		HF: 16 Ohms; LF : 16 Ohms;
Recommended amplifiers		HF: 875 to 1550 Watts into 4 Ohms LF: 1750 to 3100 Watts into 4 Ohms
3 GEO S1210 in Parallel		
4 GEO S1210 in parallel		HF: 1000 to 1800 Watts into 4 Ohms LF: 2000 to 3600 Watts into 4 Ohms
6 GEO S1210 in parallel		HF: 1650 to 3000 Watts into 2 Ohms LF: 3300 to 6000 Watts into 2 Ohms
SYSTEM OPERATION		
Electronic controller		The NEXO TDcontrollers presets are precisely matched to the GEO S12 Series cabinets and include sophisticated protection. Using GEO S12 Series cabinets without a properly connected NEXO TDcontrollers will result in poor sound quality and can damage components.
Array design		Arrays of less than 4 x GEO S1210 will provide poor dispersion control and are neither recommended nor supported.
Sub-bass		CD18 / GEO SUB / S2 extend system low frequency response down to 32 Hz / 38 Hz / 32 Hz
Speaker cables		Active:; 1'/1 ⁺ :LF; 2'/2 ⁺ : HF Passive: 1'/1 ⁺ : Not Connected; 2'/2 ⁺ :LF + HF.
Accessories		Please refer to the GEO S12 user manual before any operation.

As part of a policy of continual improvement, NEXO reserves the right to change specifications without notice.

[a] Response curves and data: anechoic far field above 200 Hz, half-space anechoic below 200 Hz.

[b] Sensitivity & peak SPL: will depend on spectral distribution. Measured with band limited pink noise.

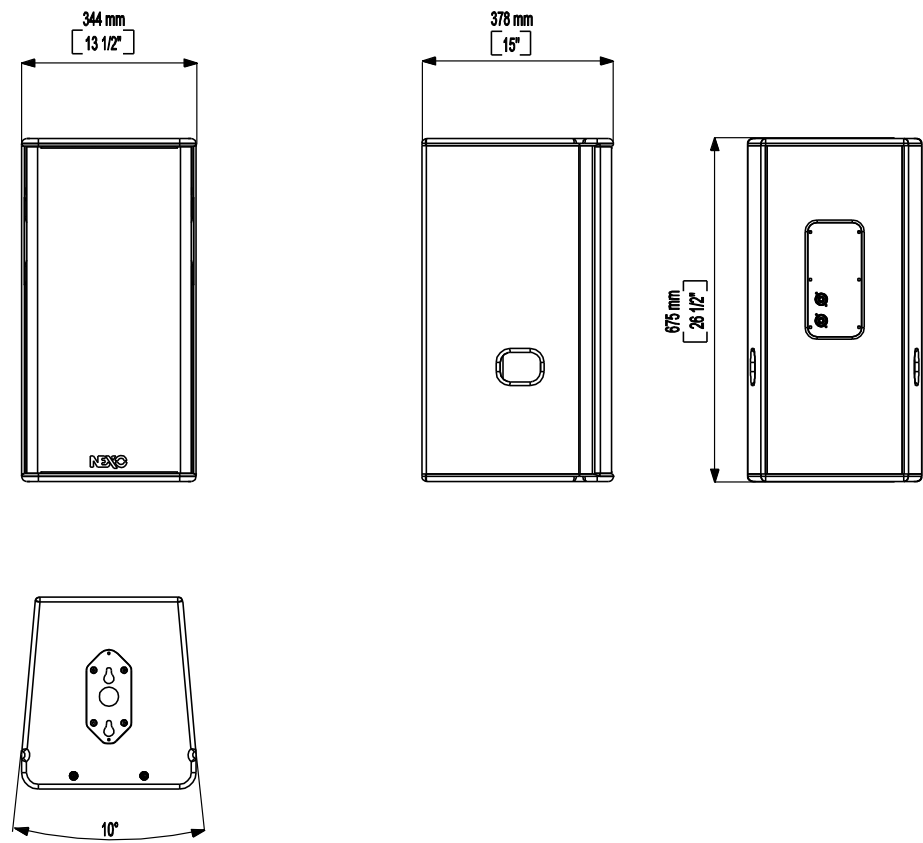
Refers to the specified \pm 3 dB range. Data are for speaker + processor + recommended amplifier combinations.

[c] Directivity curves and data: 1/3 octave smoothed frequency response, normalized to on-axis response. Data obtained by computer processing of off-axis response curves.

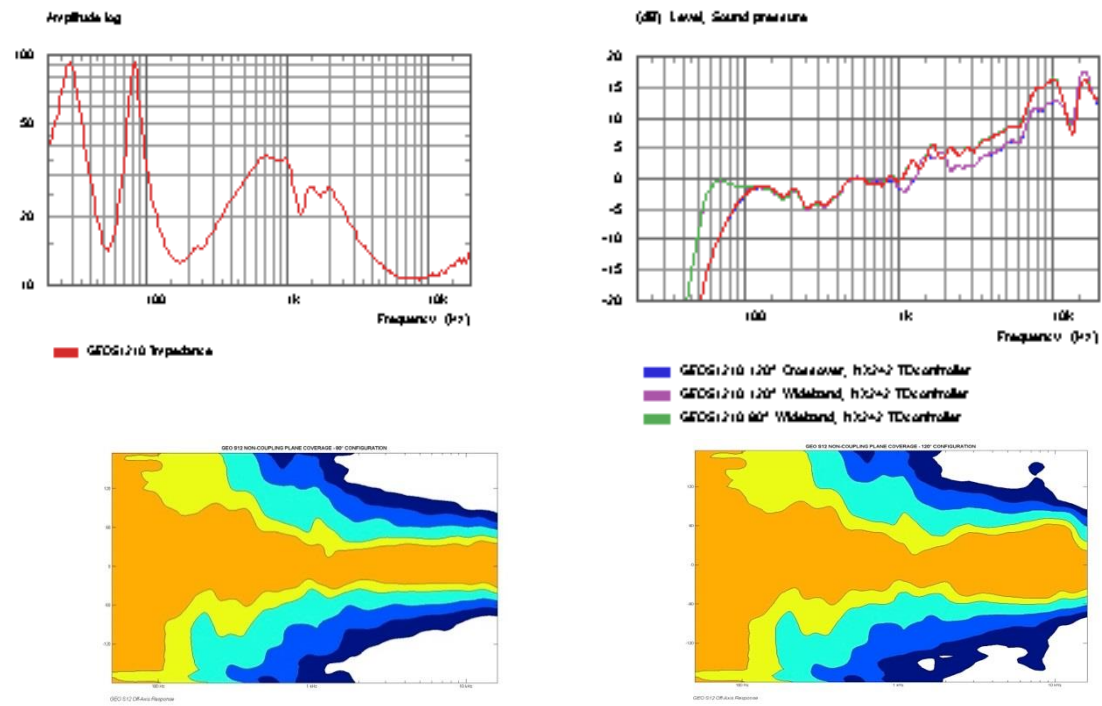
[d] Please refer to the GEO S12 user Manual.

Usable range data: frequency response capability with TD crossover slopes removed.

11.3.2 Dimensions



11.3.3 Diagrams

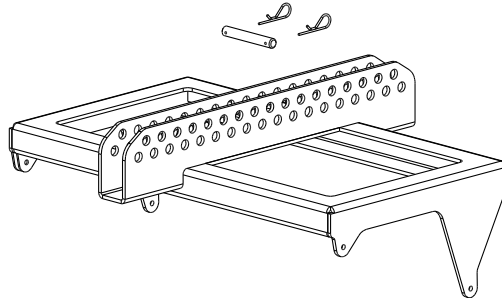


11.4 GEO S12 Touring Applications Accessories

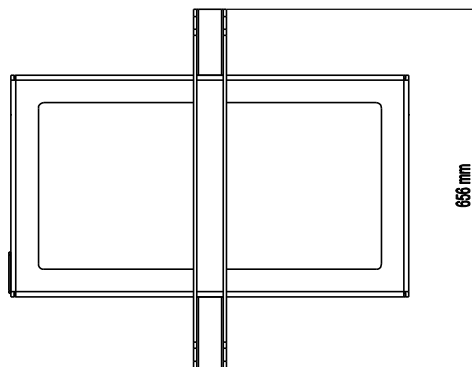
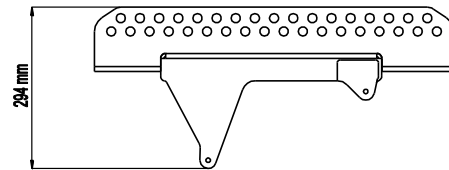
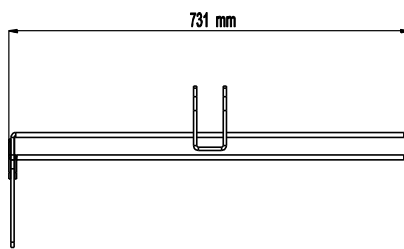
11.4.1 GPT- BUMPER

Parts

04GPT-BUMPER



Dimensions



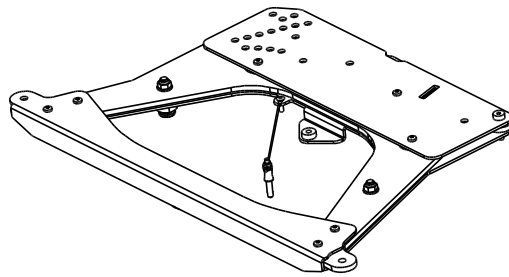
Weight

20 kg / 44.1 Lbs

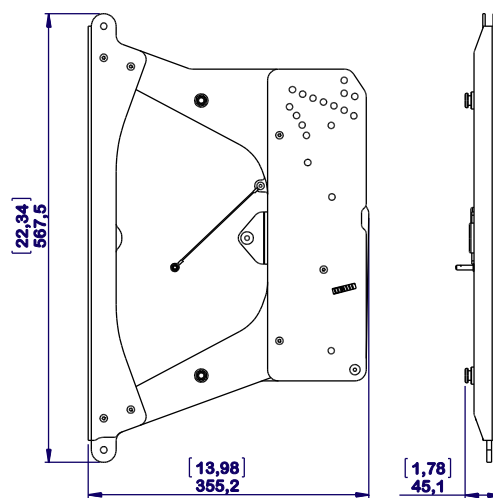
11.4.2 LS18 Rigging Plates

Parts

LST-XBOW



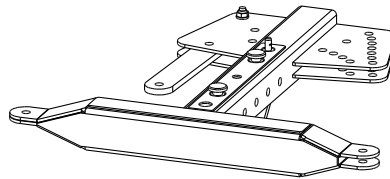
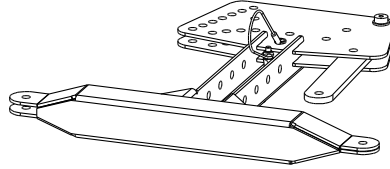
Dimensions



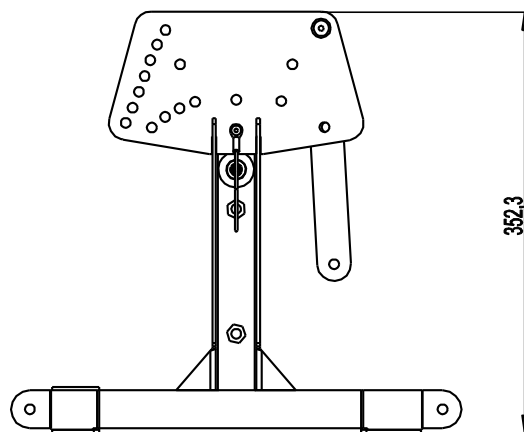
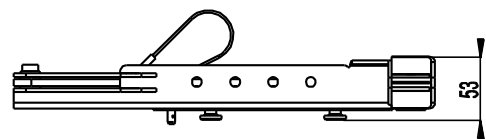
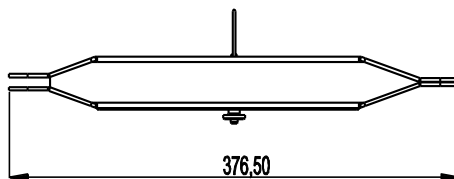
11.4.3 GEO S12 Rigging Plates

Parts

04GPT-XBOW



Dimensions



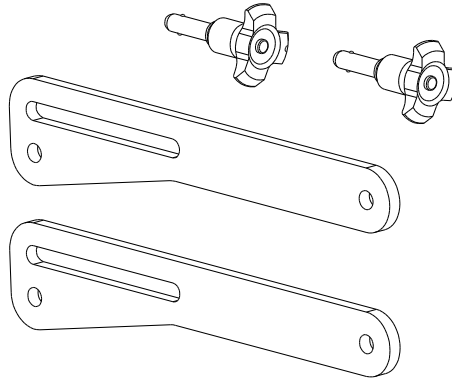
Weight (pair)

10.7 kg / 23.6 Lbs

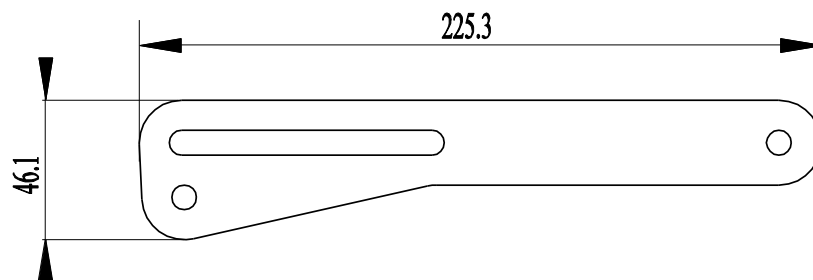
11.4.4 Tension Mode Link Bars for GPT-XBOW

Parts

04GPT-TLB



Dimensions



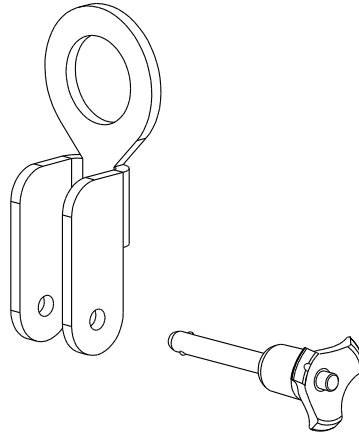
Weight (pair)

0.6 kg / 1.3 Lbs

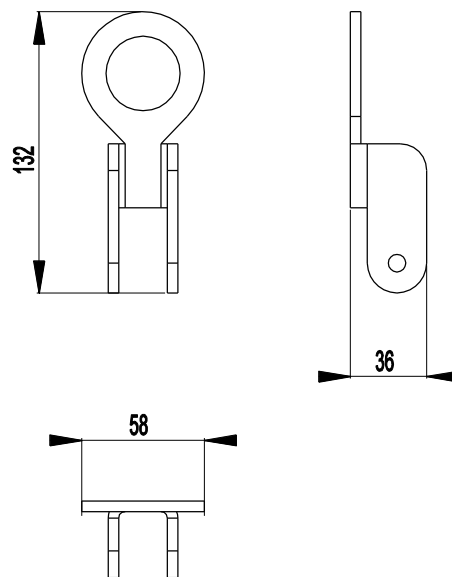
11.4.5 Lifting Ring

Parts

04VNT-XHBRK



Dimensions



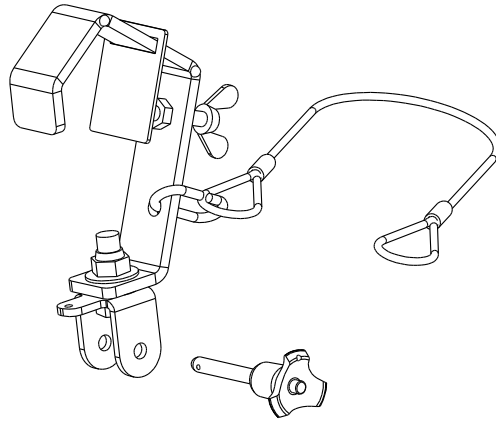
Weight (kit)

0.3 kg / 0.661 Lbs

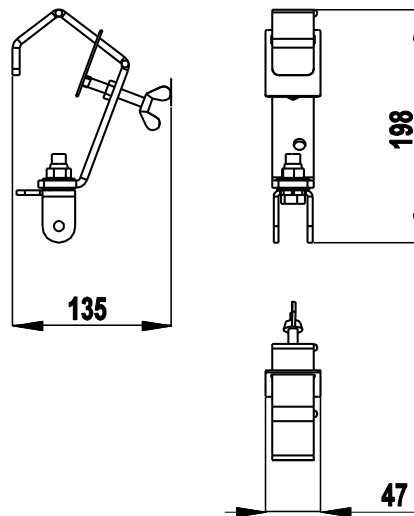
11.4.6 Truss hook for GPT-PSBRK or GPT-SSBRK

Parts

04VNT-TCBRK



Dimensions



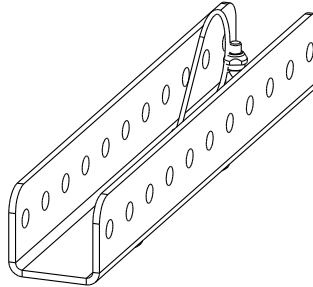
Weight (kit)

0.620 kg / 1.37 Lbs

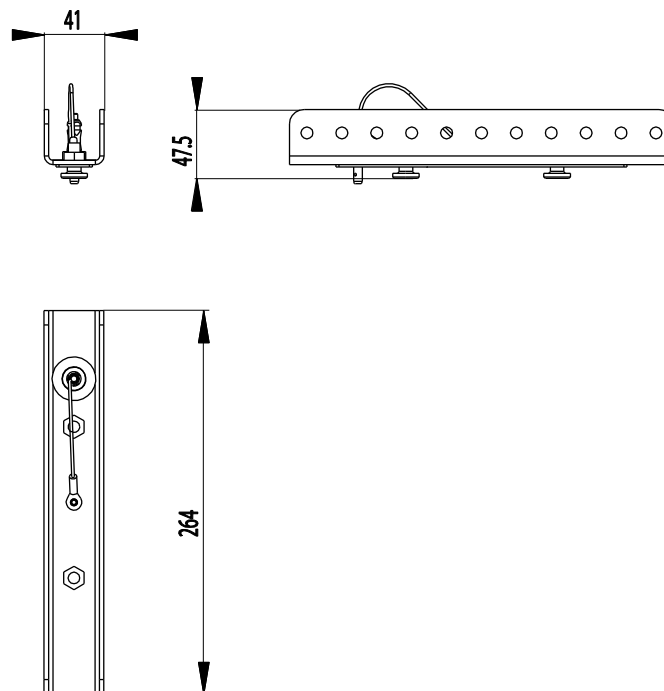
11.4.7 Truss hook for single vertical GEO S12

Parts

04VNT-TTC



Dimensions



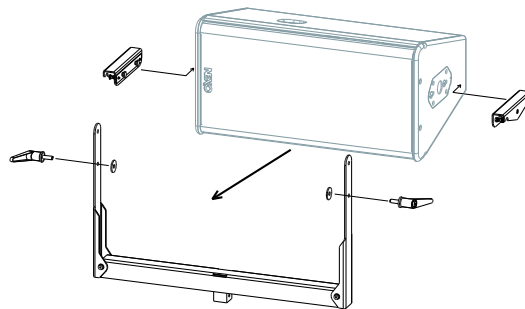
Weight (kit)

0.7 kg / 1.54 Lbs

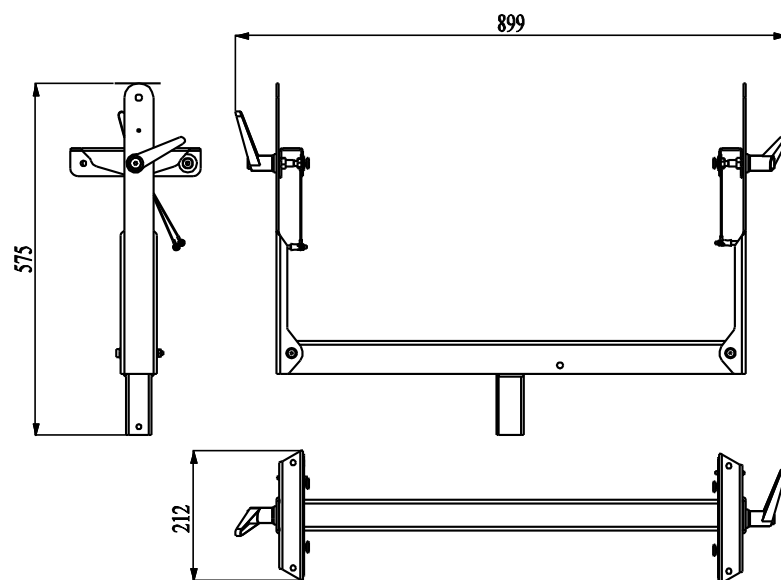
11.4.8 “U” Bracket for single vertical GEO S12

Parts

04GPT-SSBRK



Dimensions



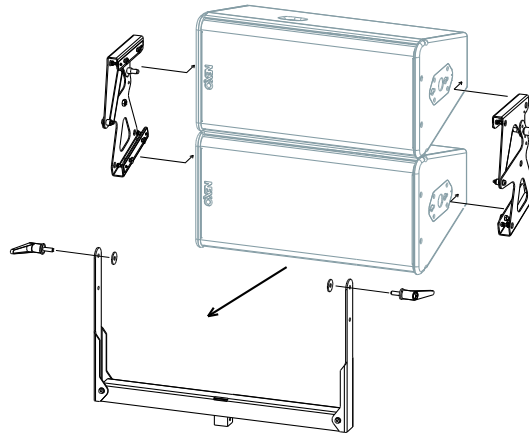
Weight (kit)

7 kg / 15.4 Lbs

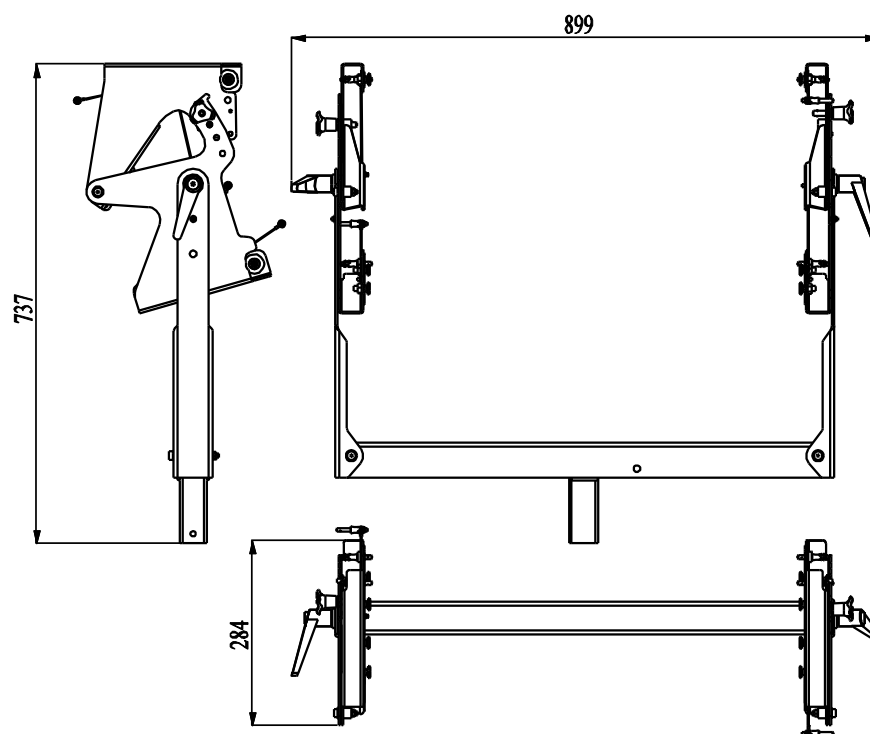
11.4.9 U" Bracket for two vertical GEO S12

Parts

04GPT-PSBRK



Dimensions



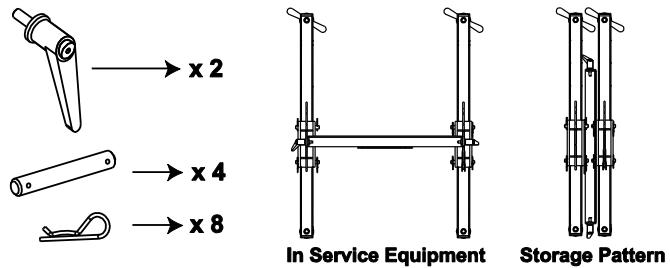
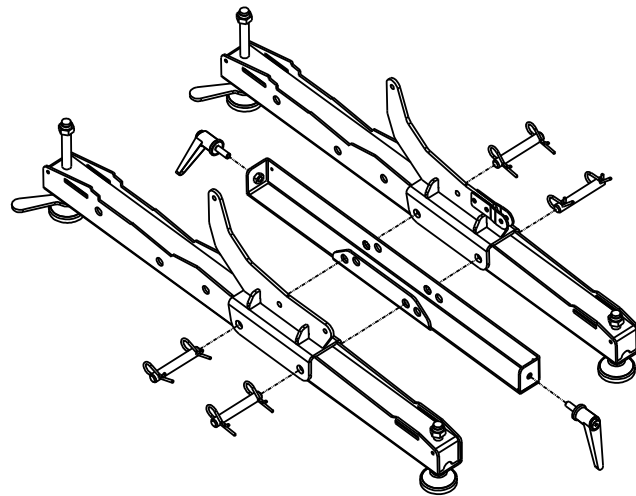
Weight (kit)

10.4 kg / 22.9 Lbs

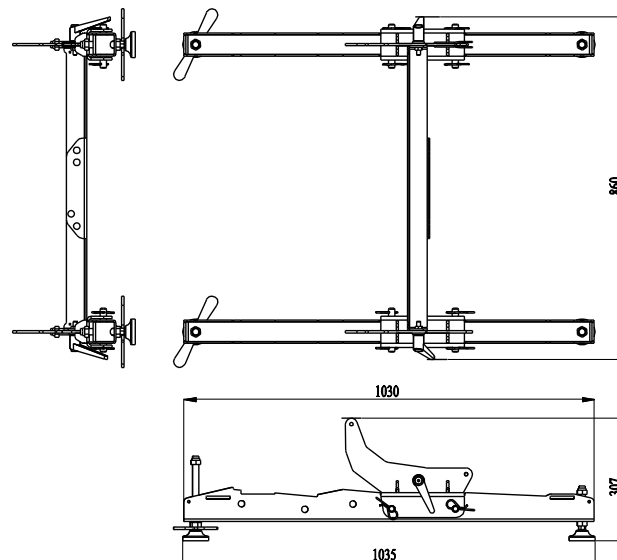
11.4.10 Ground Stacking Device for up to 6 GEO S1210

Parts

04GPT-GSTK



Dimensions



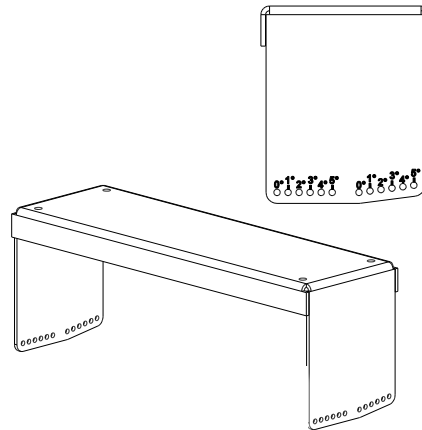
Weight (kit)

26.5 kg / 58.4 Lbs

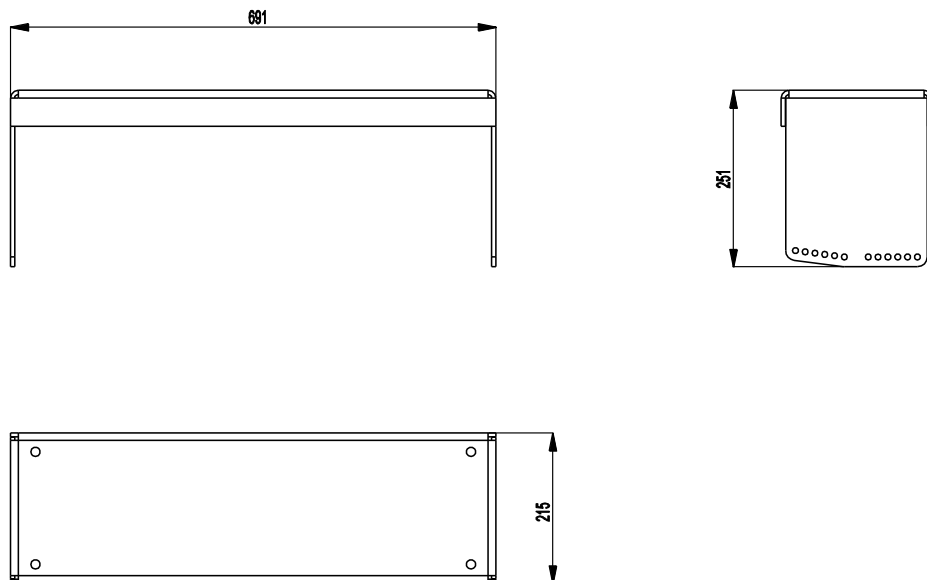
11.5 **GEO S12 Fixed Installations Accessories**

11.5.1 **LS18 & GEO S12 Bumper (VNI-BUMPER)**

Parts



Dimensions

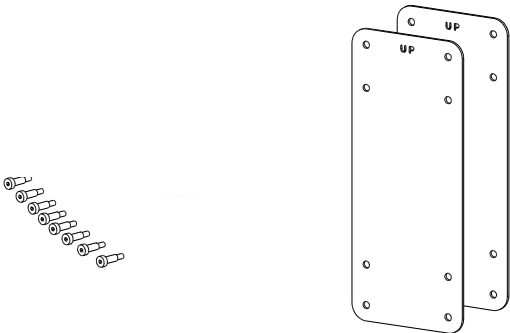


Weight (kit)

14.5 kg / 32 Lbs

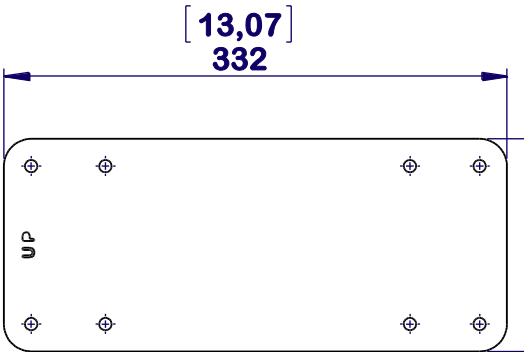
11.5.2 LS18 Counter Plate (LSI-CPLA)

Parts



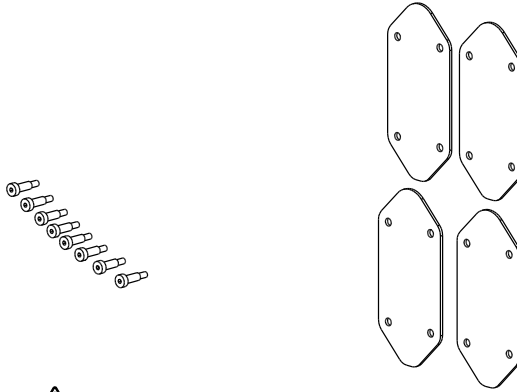
⚠ WARNING : *Screws must be secured using Loctite 243™*

Dimensions



11.5.3 GEO S12 Counter Plate (VNI-CPLA)

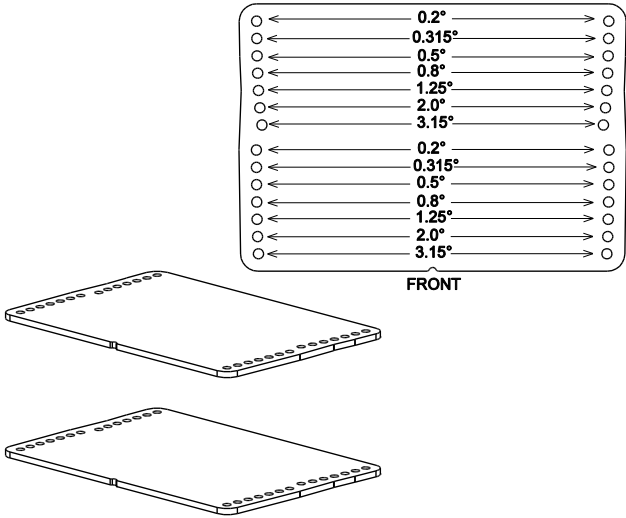
Parts



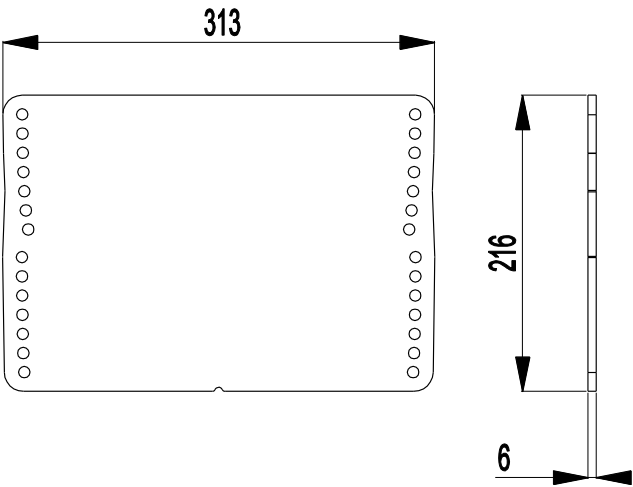
⚠ WARNING : Screws must be secured using Loctite 243™

11.5.4 LS18 & GEO S12 Connecting Plate 1 (VNI-ANPL1)

Parts



Dimensions

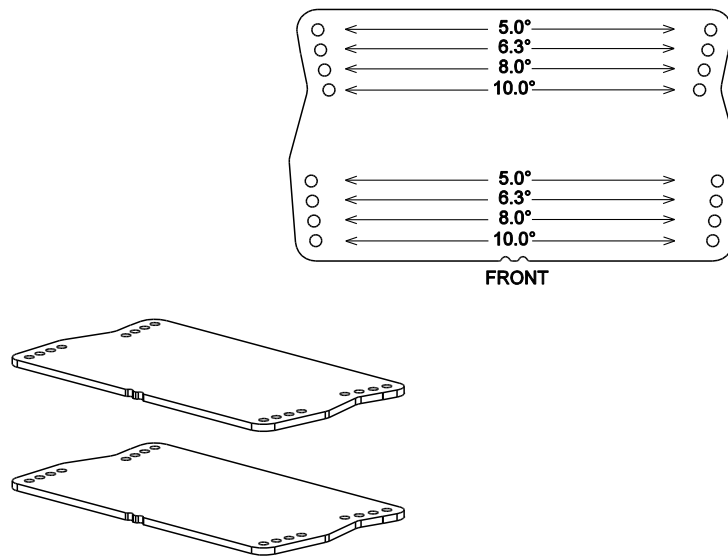


Weight (kit)

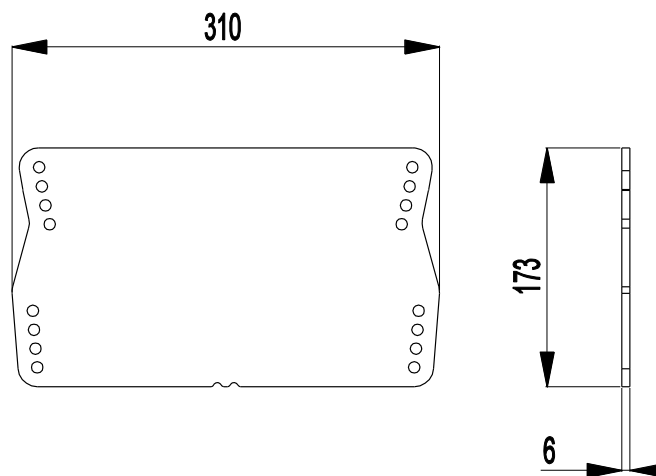
7.5 kg / 16.5 Lbs

11.5.5 GEO S12 Connecting Plate 2 (VNI-ANPL2)

Parts



Dimensions

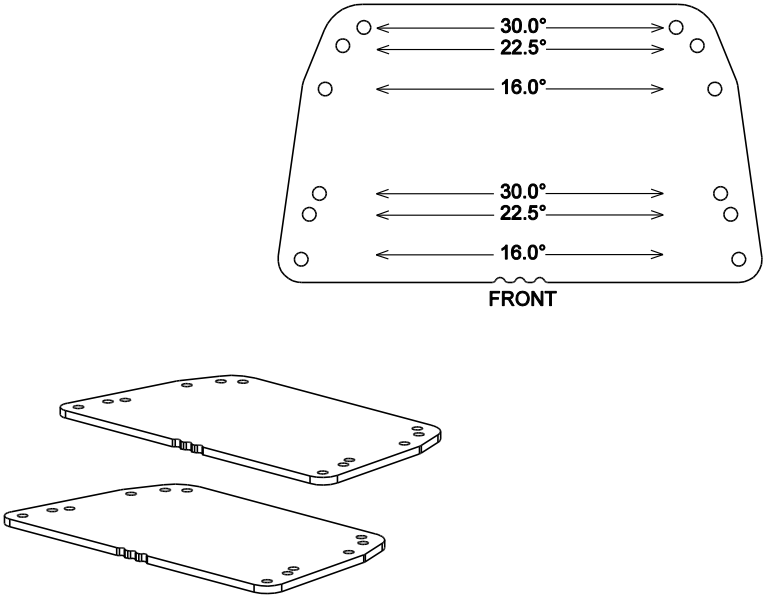


Weight (kit)

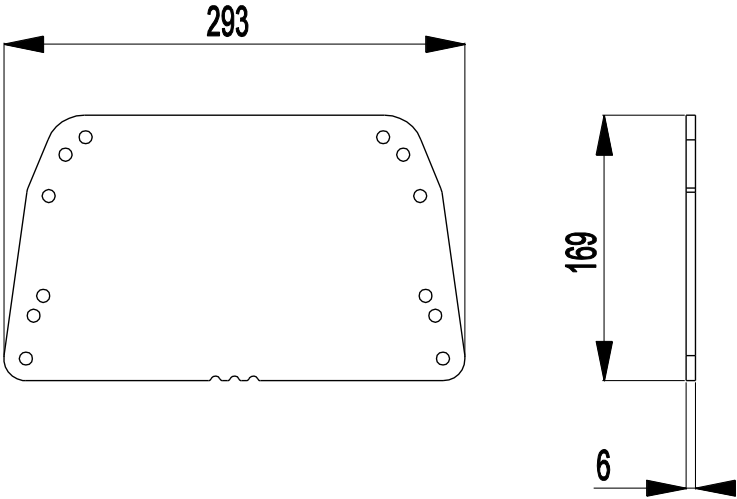
6.2 kg / 13.7 Lbs

11.5.6 GEO S12 Connecting Plate 3 (VNI-ANPL3)

Parts



Dimensions



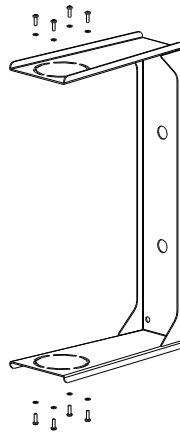
Weight (kit)

5.5 kg / 12.1 Lbs

11.5.7 Single GEO S12 “U” Bracket

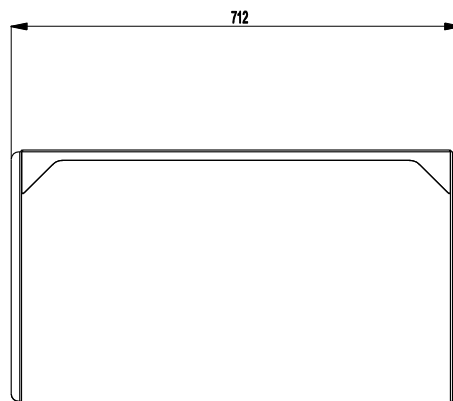
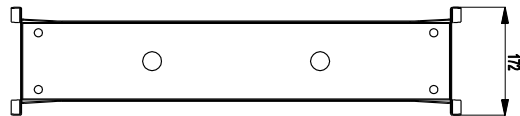
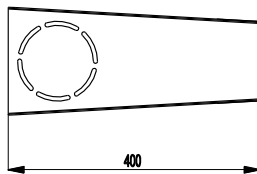
Parts

04VNI-UBRK12



 **WARNING :** Screws must be secured using Loctite 243™

Dimensions



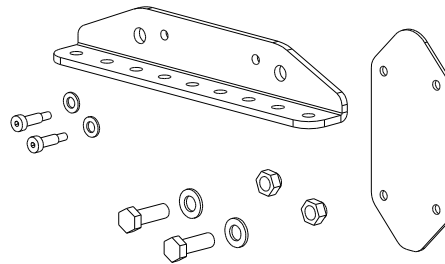
Weight

2.9 kg / 6.4 Lbs

11.5.8 “L” Bracket for cable suspension

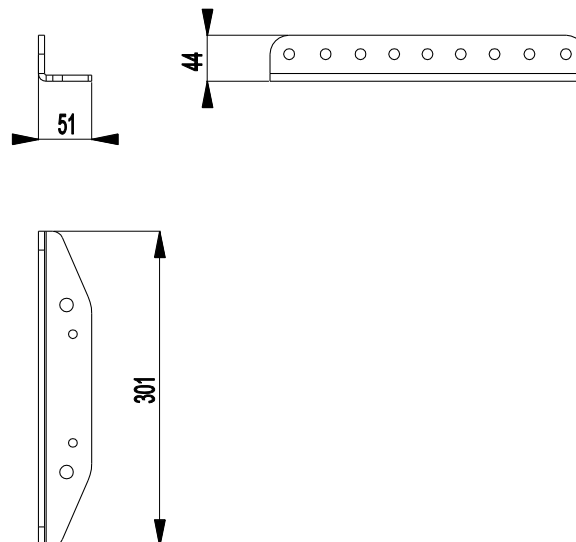
Parts

04VNI-LBRK



 **WARNING** : Screws must be secured using Loctite 243™

Dimensions



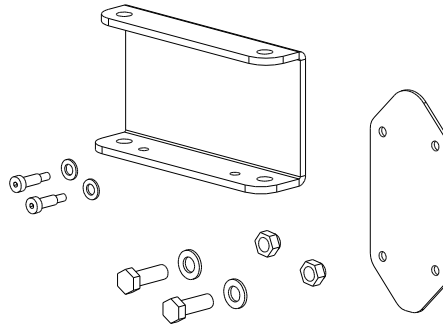
Weight (kit)

1.75 kg / 3.86 Lbs

11.5.9 “U” Bracket for rigid suspension

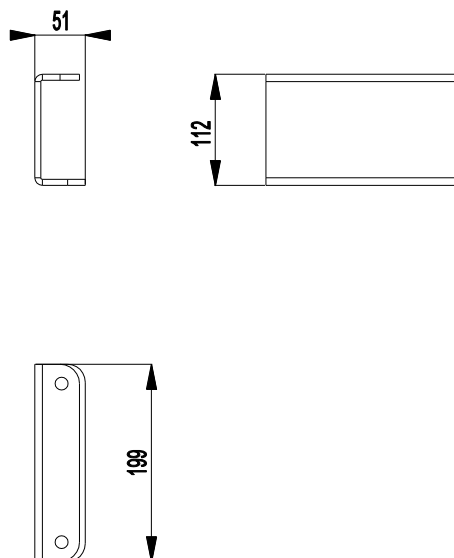
Parts

04VNI-ABRK



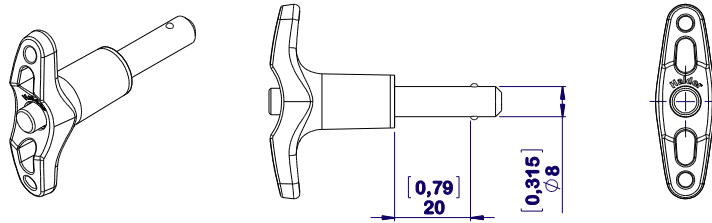
 **WARNING :** Screws must be secured using Loctite 243™

Dimensions



Weight (kit)

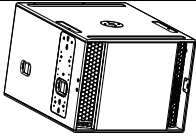

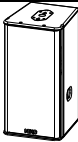
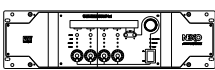
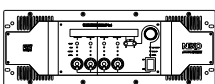
1.75 kg / 3.86 Lbs

11.5.10 GEO S12 Push-Pins (04VXT-BL820)**04VXT-BL820**

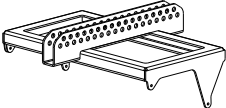
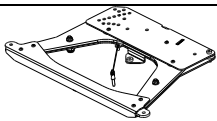
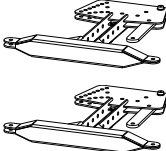


WEIGHT: 0.032 KG / 0.07 LBS





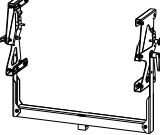
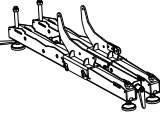
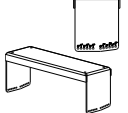
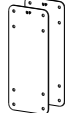


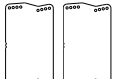
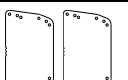
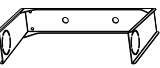
12 GEO S12 SERIES PARTS & ACCESSORIES LIST


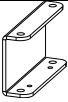
12.1 Modules & Control Electronics List

MODEL	DRAWING	DESCRIPTION
LS18		Subwoofer Module
GEO S1230		GEO S1230 Module
GEO S1210		GEO S1210 Module
NXAMP4x1		Digital Powered Controller 4x1300W
NXAMP4x4		Digital Powered Controller 4x4000W

12.2 Accessories List

MODEL	DRAWING	DESCRIPTION
GPT-BUMPER		Main GEOS12 Bumper for touring application.
LST-XBOW		Rigging plates for LS18 touring applications (pair).
GPT-XBOW		Rigging plates for GEO S12 touring applications (pair).
GPT-TLB		Link Legs for GPT-XBOW with Oblong Holes (pair, includes 2 8x20 Quick Release Pins)
BL820		8x20 Quick Release Pin for Geo S8 / GeoS12 / RS15

MODEL	DRAWING	DESCRIPTION
VNT-XHBRK		Lifting Ring for GPT-SSBRK or GPT-PSBRK or GPT-XBOW (includes 8x45 Quick Release Pin).
VNT-TCBRK		Truss hook for GPT-SSBRK or GPT-PSBRK or GPT-XBOW (includes 8x45 Quick Release Pin)
VNT-TTC		Truss hook for single vertical GEO S12
GPT-SSBRK		"U" Bracket for single horizontal GEO S12 on tripod or on truss hook or lifting ring
GPT-PSBRK		U" Bracket for two GEO S12 on subwoofer pole stand or on truss hook or on lifting ring
GPT-GSTK		Ground Stack Device for up to 6 Geo S1210
VNI-BUMPER		Main LS18 & GEOS12 Bumper for fixed installation.
LSI-CPLA		LS18 Counter-Plates for fixed installation
VNI-CPLA		GEO S12 Counter-Plates for fixed installation
VNI-ANPL1		Geo S12 and LS18 Connecting Plates / range: 0.20° - 3.15° for fixed installation.
VNI - ANPL2		Geo S12 Connecting Plates / range: 5.00° - 10.00° for fixed installation.
VNI - ANPL3		Geo S12 Connecting Plates / range: 16.00° - 30.00° for fixed installation.
VNI-UBRK12		"U" Bracket for fixed installation.

MODEL	DRAWING	DESCRIPTION
VNI- LBRK		“L” Bracket for cable suspension (for fixed installation).
VNI- ABRK		“U” Bracket for rigid suspension (for fixed installation).
GPT-2CASE		Flight Case for 2 GEO S12 with accessory tray
GPT-3CASE		Flight Case for 3 GEOS12 equipped with XBOWS
GPT-BCASE		Flight Case for 2 GEO S12 bumpers and accessories

13 USER NOTES

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