

SB 18



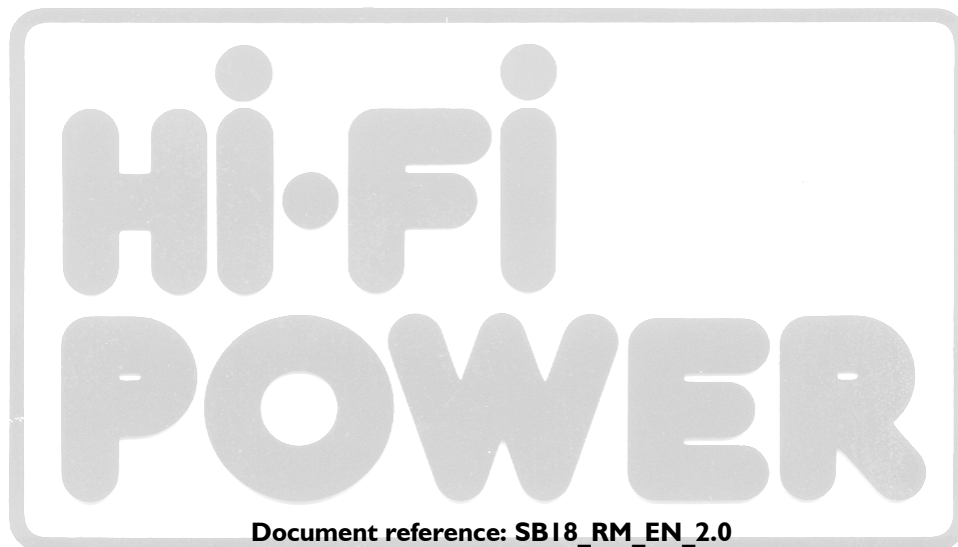
rigging manual (EN)



SB18 SUBWOOFER

RIGGING MANUAL

VERSION 2.0



Document reference: SB18_RM_EN_2.0

Distribution date: September 3, 2024

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SAFETY INSTRUCTIONS

1. **Read this manual**
2. **Heed all SAFETY INSTRUCTIONS as well as DANGER and OBLIGATION warnings**
3. **Never incorporate equipment or accessories not approved by L-ACOUSTICS®**
4. **Read all the related PRODUCT INFORMATION documents before exploiting the system**
The **product information** document is included in the shipping carton of the related system component.
5. **Work with qualified personnel for rigging the system**
Installation should only be carried out by qualified personnel that are familiar with the rigging techniques and safety recommendations outlined in this manual.
6. **Ensure personnel health and safety**
During installation and set-up personnel must wear protective headgear and footwear at all times. Under no circumstances personnel is allowed to climb on a loudspeaker assembly.
7. **Respect the Working Load Limit (WLL) of third party equipment**
L-ACOUSTICS® is not responsible for any rigging equipment and accessories provided by third party manufacturers. Verify that the Working Load Limit (WLL) of the suspension points, chain hoists and all additional hardware rigging accessories is respected.
8. **Respect the maximum configurations and the recommended safety level**
For safety issue, respect the maximum configurations outlined in this manual. To check the conformity of any configuration in regards with the safety level recommended by L-ACOUSTICS®, model the system in SOUNDVISION and refer to the warnings in **Mechanical Data** section.
9. **Be cautious when flying a loudspeaker array**
Always verify that no one is standing underneath the loudspeaker array when it is being raised. As the array is being raised, check each individual element to make sure that it is securely fastened to the adjacent element. Never leave the array unattended during the installation process. As a general rule, L-ACOUSTICS® recommends the use of safety slings at all times.
10. **Be cautious when ground-stacking a loudspeaker array**
Do not stack the loudspeaker array on unstable ground or surface. If the array is stacked on a structure, platform, or stage, always check that the latter can support the total weight of the array. As a general rule, L-ACOUSTICS® recommends the use of safety straps at all times.
11. **Take into account the wind effects on dynamic load**
When a loudspeaker assembly is deployed in an open air environment, wind can produce dynamic stress to the rigging components and suspension points. If the wind force exceeds 6 bft (Beaufort scale), lower down and/or secure the loudspeaker array.

SYMBOLS

The following symbols are used in this document:



DANGER

This symbol indicates a potential risk of harm to an individual or damage to the product. It can also notify the user about instructions that must be strictly followed to ensure safe installation or operation of the product.



OBLIGATION

This symbol notifies the user about instructions that must be strictly followed to ensure proper installation or operation of the product.



INFORMATION

This symbol notifies the user about complementary information or optional instructions.

WELCOME TO L-ACOUSTICS®

Thank you for choosing the L-ACOUSTICS® SB18 subwoofer enclosure.

This document contains essential information on rigging the system properly and safely. Carefully read this document in order to become familiar with these procedures.

As part of a continuous evolution of techniques and standards, L-ACOUSTICS® reserves the right to change the specifications of its products and the content of its document without prior notice.

Please check the L-ACOUSTICS® web site on a regular basis to download latest updates for documents and software: www.l-acoustics.com.

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1 RIGGING SYSTEM

The system approach developed by L-ACOUSTICS® consists in providing packaged solutions for loudspeaker system in order to guarantee the highest and most predictable level of performance at any step: modeling, installation, and operation. An L-ACOUSTICS® loudspeaker system is the set of components available to form any loudspeaker system based on one of the full-range loudspeaker enclosure afforded by L-ACOUSTICS®. It includes enclosures, rigging accessories, loudspeaker cables, amplified controllers, and software applications.

The SB18 subwoofer is especially adapted to the following systems: KUDO®, KARA®, KIVA/KILO, and to the coaxial XT enclosures from L-ACOUSTICS®. It extends the low frequency response of a loudspeaker system down to 32 Hz.

The main components involved in the **SB18** rigging process are the following:

1.1 Loudspeaker enclosure

SB18 Compact subwoofer with captive rigging system

1.2 Rigging elements

M-BUMP	Frame for flying or ground-stacking a vertical SB18 and/or KARA array, provided with 2 bow shackles (Ø19mm), 4 short ball-locking pins (Ø5/16"x1"), and 4 long ball-locking pins (Ø5/16"x1.9")
M-BAR	Extension bar for the M-BUMP frame, provided with 2 bow shackles (Ø19mm) and 2 T-shaped ball-locking pins (3/8")
M-JACK	Platform feet (x4) for M-BUMP provided in a package with KARA-ANGARMEX
KARA-MINIBU	Frame for flying or stacking a small vertical SB18 and/or KARA array, provided with 2 bow shackles (Ø12mm) and 4 round-shaped ball-locking pins (5/16")
KARA-MINIBUEX	2 Extension arms for the KARA-MINIBU frame, provided with 4 T-shaped ball-locking pins (5/16"); 6 screws (M8 x 25mm) and 6 self-locking nuts
CLAMP250	Truss clamp

1.3 Software application

SOUNDVISION Proprietary 3D acoustical and mechanical modeling software.

1.4 Accessories

SB18PLA	Removable front dolly board for moving the SB18 enclosure and protecting its front grill during transportation and storage
SB18COV	Protective cover for transportation and storage



New ball-locking pins on SB18 and M-BUMP

Former versions of SB18 and M-BUMP may be equipped with T-shaped ball-locking pins (T-BLP). These T-BLP are no longer supplied for these products and are replaced by equivalent round-shaped BLP. This change has no functional impact on rigging procedures.

Illustrations in this manual show former versions of SB18 and M-BUMP with T-BLP.

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SOUNDVISION



M-BUMP



M-JACK



M-BAR



KARA-MINIBUEX



KARA-MINIBU



CLAMP250



SB18PLA



SB18COV

Main components involved in the SB18 rigging process

2 MECHANICAL SAFETY

2.1 Maximum configurations

The SB18 rigging system complies with BGV-C1 (2012) and EN ISO 12100-1 (2004) when SOUNDVISION software does not indicate any *stress warning*.



Mechanical safety of the shackles

The *bow* shackles $\varnothing 12\text{mm}$ and $\varnothing 19\text{mm}$ provided by L-ACOUSTICS® have a working load limit (WLL) of respectively 1000 kg, and 3250 kg with a 6:1 safety factor. These ratings are in accordance with BGV-C1 (2012) recommendations when implementing the maximum configurations authorized by L-ACOUSTICS®.



Mechanical safety of the rigging system

Before any installation, always model the system in SOUNDVISION and check the **Mechanical Data** section for any *stress warning* or *stability warning*.

2.2 Assessing mechanical safety

In order to assess the actual safety of any array configuration before implementation, refer to the following warnings:



Rated working load limit (WLL) is not enough

The rated WLL is an indication of the element resistance to tensile stress. For complex mechanical systems such as loudspeaker arrays, WLLs cannot be used per se to determine the maximum number of enclosures within an array or to assess the safety of a specific array configuration.



Mechanical modeling with SOUNDVISION

The working load applied to each linking point, along with the corresponding safety factor, will depend on numerous variables linked to the composition of the array (type and number of enclosures, splay angles) and the implementation of the flying or stacking structure (number and location of flying points, site angle). This cannot be determined without the complex mechanical modeling and calculation offered by SOUNDVISION



Assessing the safety with SOUNDVISION

The overall safety factor of a specific mechanical configuration always corresponds to the lowest safety factor among all the linking points. Always model the system configuration with the SOUNDVISION software and check the Mechanical Data section to identify the weakest link and its corresponding working load. By default, a *stress warning* will appear when the mechanical safety goes below the recommended safety level.



Safety of ground-stacked arrays in SOUNDVISION

For ground-stacked arrays, a distinct *stability warning* is implemented in SOUNDVISION. It indicates a tipping hazard when the array is not secured to the ground, stage or platform. It is user responsibility to secure the array and to ignore this warning.



Consideration must be given to unusual conditions

SOUNDVISION calculations are based upon usual environmental conditions. A higher safety factor is recommended with factors such as extreme high or low temperatures, strong wind, prolonged exposition to salt water, etc. Always consult a rigging specialist to adopt safety practices adapted to such a situation.

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3 SYSTEM SET-UP



Dismantling an array

Apply the associated set-up procedure in reversed order.



Independent or mixed

This document only deals with independent rigging of the SB18 subwoofer enclosure.

When using the SB18 enclosure as a companion to a main system, some combined configurations will imply the set-up of mixed arrays. At this point, it is especially the case of KARA/SB18 arrays. Always refer to the rigging manual of the main system or enclosure to get acquainted with the rigging procedures specific to the mixed main/sub arrays.



Cardioid configuration

The cardioid configuration is in an array of 4 subwoofers with 1 reversed element.

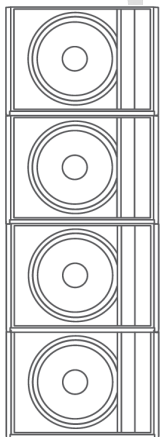
Refer to the subwoofer **user manual** for details about the CARDIOID operating mode.

Any of the following arrangements can be set in cardioid configuration.

3.1 Ground-stacking

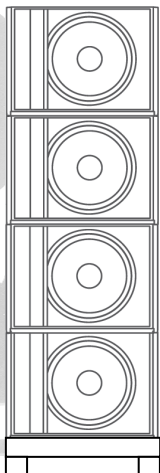
Vertical

Option 1: Stacked on the floor



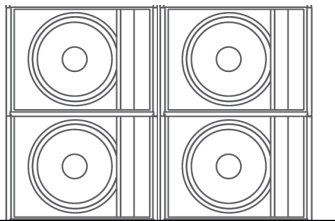
- ▶ Place and attach the enclosures on top of each other (logo down)
- ❗ Refer to PROCEDURE A

Option 2: Platform-stacked



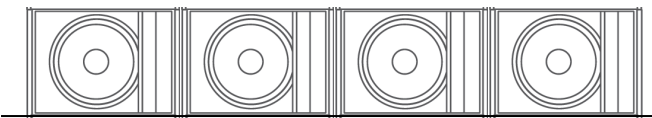
- ▶ Prepare the M-BUMP stacking platform
- ❗ Refer to PROCEDURE B
- ▶ Place and attach a first SB18 (logo up) to the platform
- ❗ Refer to PROCEDURE A
- ▶ Place and attach the enclosures (logo up) on top of each other
- ❗ Refer to PROCEDURE A

Block

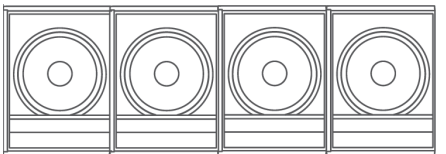


- ▶ Set vertical stacks, side by side, one after the other, by placing and attaching the SB18 enclosures on top of each other (logo down)
- ❗ Refer to PROCEDURE A

Horizontal



On-end



▶ Place the SB18 enclosures side by side

3.2 Flying



Truss clamping

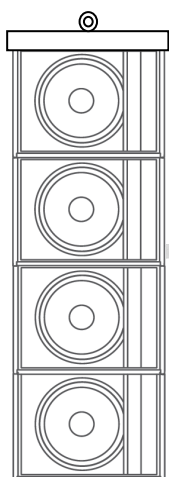
By installing a CLAMP250 instead of a shackle, an array can be attached to a truss. Refer to PROCEDURE D.



Choose the flying option before rigging the system

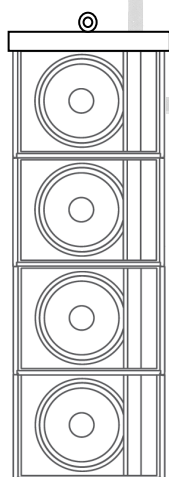
Identify the appropriate flying option and rigging hole(s) by modeling the system in SOUNDVISION, and refer to APPENDIX A for M-BUMP flying structure or APPENDIX B for KARA-MINIBU flying structure.

Vertical with M-BUMP



- ▶ Assemble a stack of 2 SB18 enclosures (logo down) under the motor location
- ❗ Refer to PROCEDURE A
- ▶ Attach the M-BUMP frame to the top SB18 enclosure, with laser slits towards the audience
- ❗ Refer to PROCEDURE A
- ▶ Prepare the **M-BUMP flying structure**
- ❗ Refer to PROCEDURE C
- ▶ Attach the motor hook to the shackle(s) on the M-BAR
- ▶ Raise the array so that it is possible to place another stack of two SB18 under it
- ▶ Assemble a stack of 2 SB18 enclosures (logo down) under the motor location
- ❗ Refer to PROCEDURE A
- ▶ Lower the array until it rests on the new stack
- ▶ Attach the bottom SB18 enclosure of the first stack to the top SB18 of the new stack
- ❗ Refer to PROCEDURE A
- ▶ To add more enclosures, repeat the previous 4 steps until the array is completed
- ▶ Raise the array

Vertical with KARA-MINIBU



- ▶ Prepare the **KARA-MINIBU flying structure**
- ❗ Refer to PROCEDURE D
- ▶ Assemble a stack of 2 SB18 enclosures (logo down) under the motor location
- ❗ Refer to PROCEDURE A
- ▶ Attach the KARA-MINIBU on the top SB18 enclosure, in front or rear extension (refer to the chosen rigging option)
- ❗ Refer to PROCEDURE A
- ▶ Attach the motor hook to the shackle(s) on the KARA-MINIBU
- ▶ Raise the array so that it is possible to place another stack of two SB18 under it (for 2 SB18 only, directly raise the array to its final height and end the procedure)
- ▶ Assemble a stack of 2 SB18 enclosures (logo down) under the motor location
- ❗ Refer to PROCEDURE A
- ▶ Lower the array until it rests on the new stack
- ▶ Attach the bottom SB18 enclosure of the first stack to the top SB18 of the new stack
- ❗ Refer to PROCEDURE A
- ▶ Raise the array

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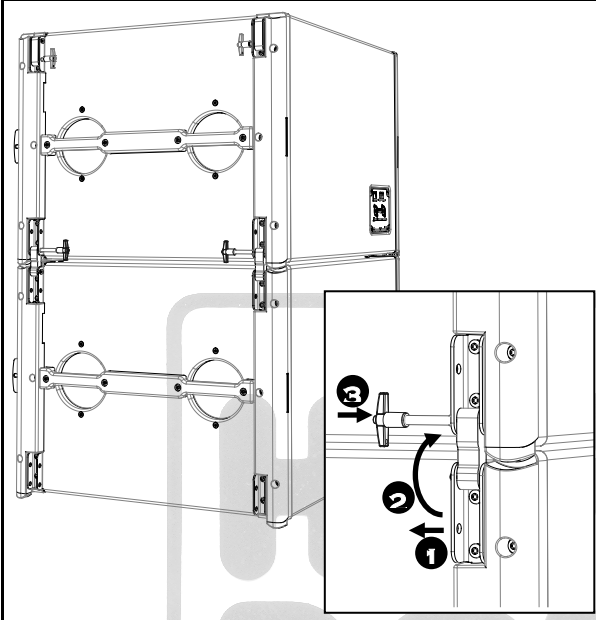
4 RIGGING PROCEDURES

A. Attaching an SB18 to a second element

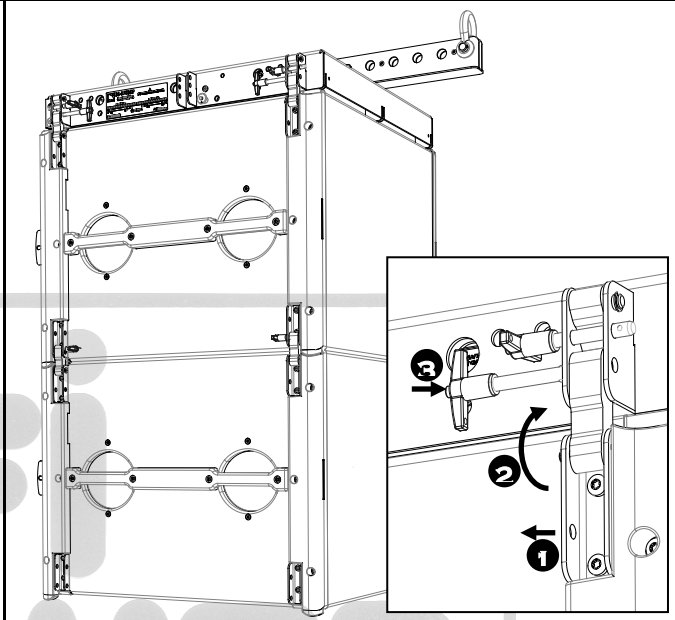
At the four corners:

- 1 Remove the pin from the SB18.
- 2 Rotate the corresponding rigging arm so that it sits in the rigging track of the adjacent enclosure.
- 3 Insert the pin through both the rigging point of the second element and the SB18 rigging arm.

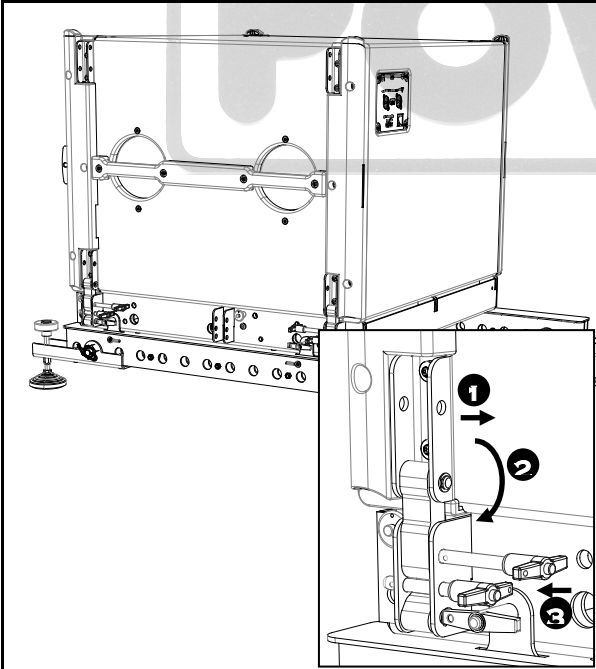
► PROCEDURE A (4 different scenarios)



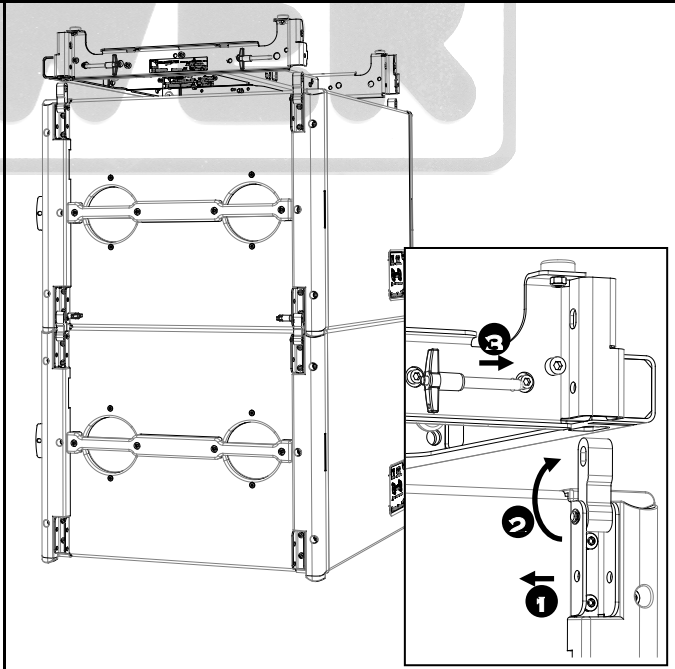
► Attaching two SB18 enclosures together



► Attaching the M-BUMP flying structure to an SB18



► Attaching the bottom SB18 to the stacking platform



► Attaching the KARA-MINIBU flying structure to an SB18

B. Preparing the M-BUMP stacking platform



Required material

14 mm & 16 mm hex keys

- ① Attach two M-JACK to each of the two M-BARS.
 - a. Remove both shackles from each M-BAR, keeping the safety pins and the bolts.
 - ⚠ Refer to APPENDIX D for information about the safety pin mechanism.
 - b. At both ends of each M-BAR, align the M-JACK hole with the second M-BAR hole and secure with the bolt, nut and safety pin previously removed from one of the shackles.

- ② Attach both M-BAR/M-JACK assemblies to the M-BUMP.
 - a. Place an M-BUMP at the rigging location with the identification plate right side up
 - b. Remove both T-BLP from each M-BAR.
 - c. Place one M-BAR on each side of the M-BUMP frame, by inserting the M-BAR studs into the M-BUMP slits.
 - i** **Choosing between the front or rear extension**
At this step, install both M-BAR the same way, i.e. protruding at the front or the rear of the M-BUMP, for front or rear extension respectively. The identification plate is the reference for the front of the array, the laser slit being oriented towards the audience.
 - d. Secure the assembly by inserting the T-BLP previously removed from the two M-BAR.

- ③ Place the platform at the stacking location in the correct orientation with the M-JACK on the floor.

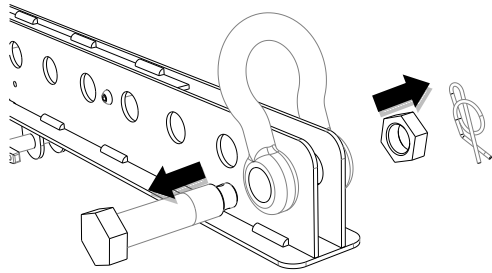
- ④ Adjust the heights of the four M-JACK to set the platform in perfect horizontal position.
 - a. Unscrew the locking nut on each M-JACK (16 mm hex key).
 - b. Place a handled inclinometer (included in the **TECH TOOLCASE**) on the platform, and rotate the 4 M-JACK knobs to adjust the platform in the horizontal position.
 - i** **Tips**
In case of resistance when turning the knob, use a 14 mm hex key to turn the base nut
 - c. Lock each M-JACK height by firmly screwing the locking nut (16 mm hex key).

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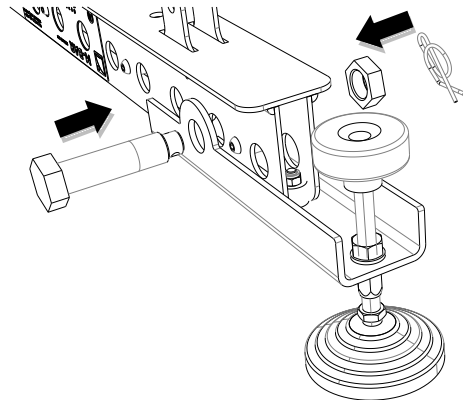
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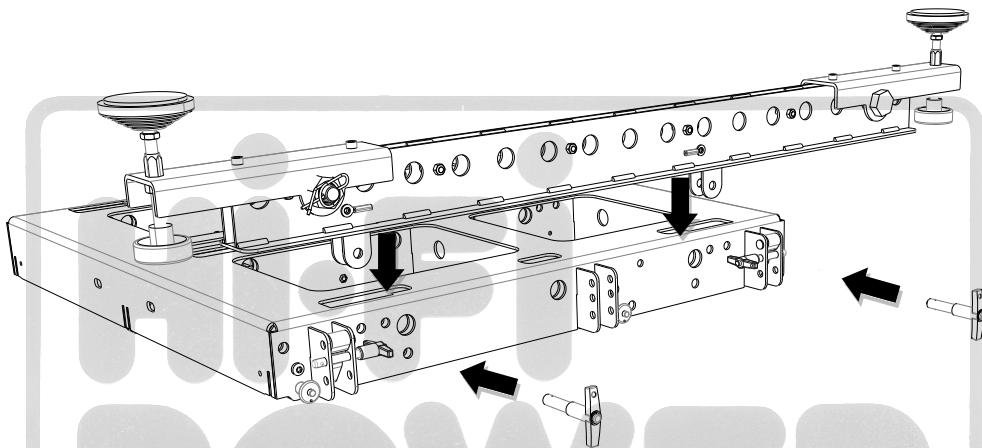
► PROCEDURE B : Preparing the M-BUMP stacking platform



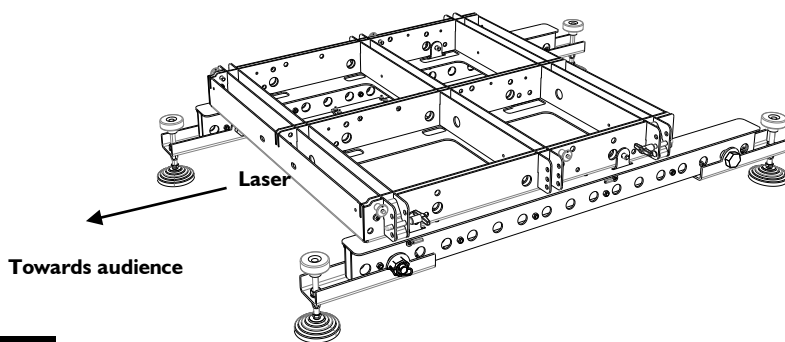
1 a A shackle being removed from an M-BAR



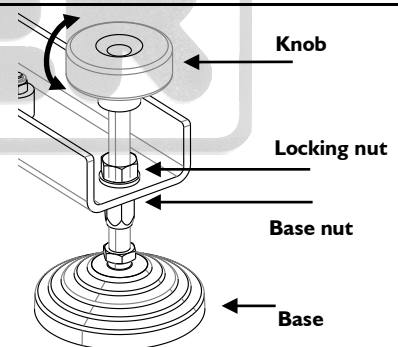
1 b M-JACK being secured to the second hole of an M-BAR



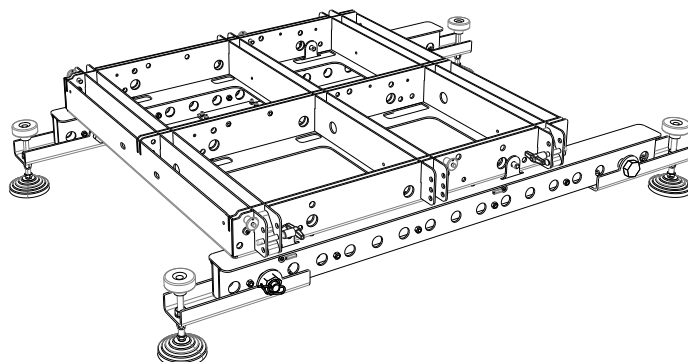
2 An M-BAR/M-JACK assembly being attached to the M-BUMP in rear extension (position A or B)



3 The stacking platform placed in rear extension



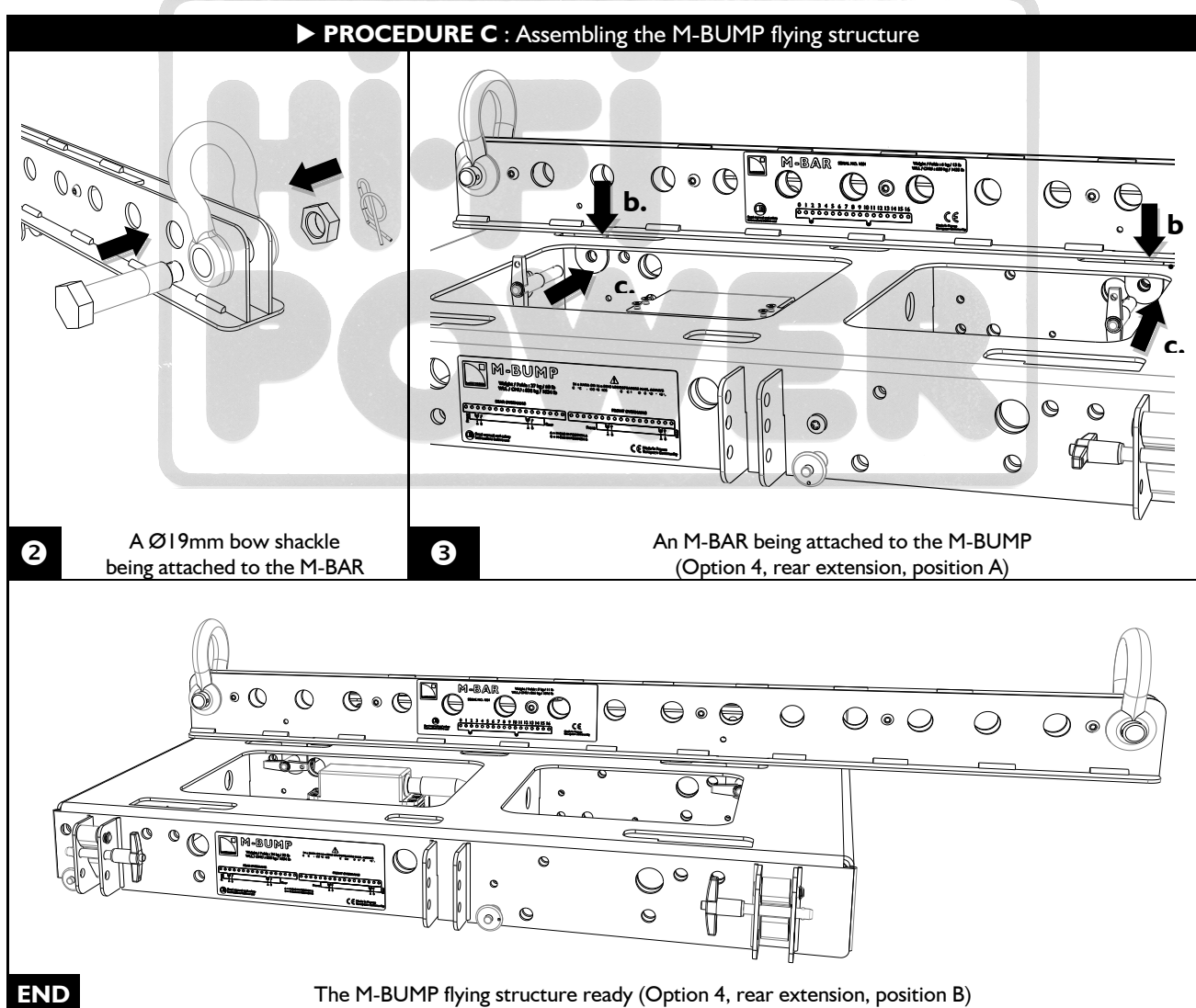
4 M-JACK height being adjusted



END The M-BUMP stacking platform ready for the enclosures

C. Preparing the M-BUMP flying structure

- 1 Refer to the modeling in SOUNDVISION and to APPENDIX A to choose the flying option for the M-BUMP structure, determining the number of M-BAR (0, 1 or 2) and their rigging position (rear or front extension, A or B).
- 2 Depending on the chosen flying option, attach one or two shackles to the M-BUMP or M-BAR(s), in the hole(s) providing the desired site angle.
- 3 If needed for the chosen flying option, attach one or two M-BAR to the M-BUMP.
 - a. Remove both pins from the M-BAR(s);
 - b. Place the M-BAR(s) on the M-BUMP by inserting the M-BAR studs into the M-BUMP slits;
 - c. Secure the assembly by re-inserting the pins previously removed from the M-BAR (s).
- 4 If needed, install a laser device on the laser plate (see APPENDIX D).



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D. Preparing the KARA-MINIBU flying structure



Required material

Electric screwdriver with torque selector, 6 mm hex bit, 13 mm hex key

- 1 Attach two KARA-MINIBUEX to the KARA-MINIBU.
 - a. Place a KARA-MINIBU at the rigging location with the identification plate right-side up;
 - b. On each side, install one KARA-MINIBUEX, with feet up, by inserting one of its stud into a KARA-MINIBU slit;
 - c. Secure the assembly by driving 3 bolts on each side (6 mm hex bit, 13 mm hex key, 7 N.m/63 in.lb).

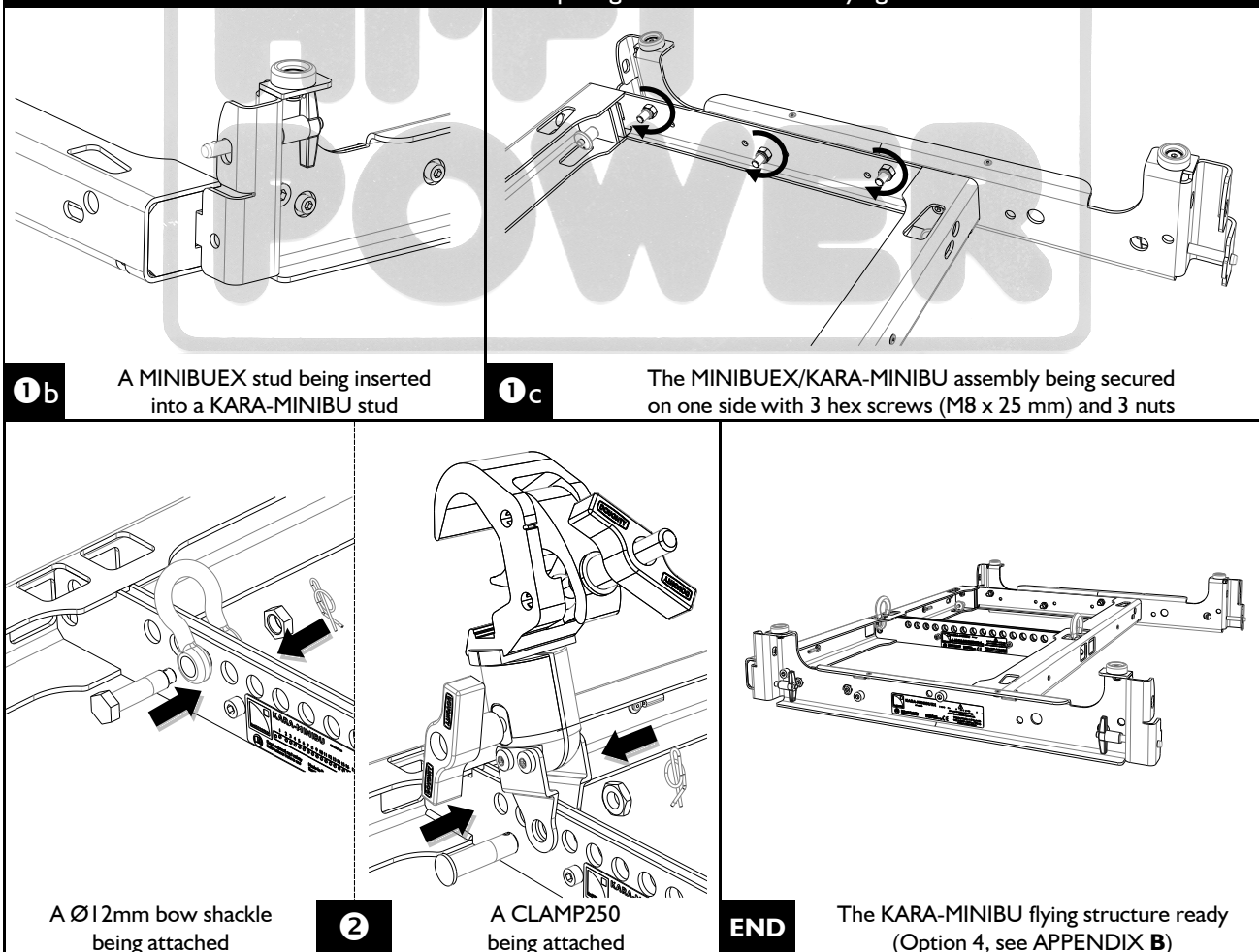


Orientation of the KARA-MINIBU frame

The KARA-MINIBU frame is symmetrical so that the installation as a front or rear extension can be achieved wherever the KARA-MINIBUEX are installed. However, it is recommended at this step to anticipate the front or rear extension so as to keep the laser plate at the front of the array.

- 2 Attach the shackle(s) to the KARA-MINIBU, in the hole(s) corresponding to the chosen flying option and providing the desired site angle (see modeling in SOUNDVISION and APPENDIX B).
- 3 If needed, install a laser device on the laser plate (see APPENDIX C).

► PROCEDURE D : Preparing the KARA-MINIBU flying structure



APPENDIX A: M-BUMP FLYING OPTIONS

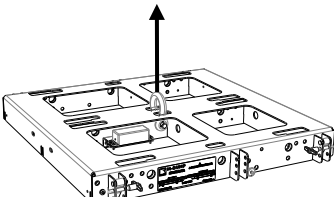
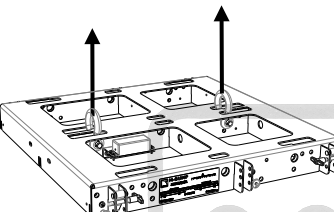
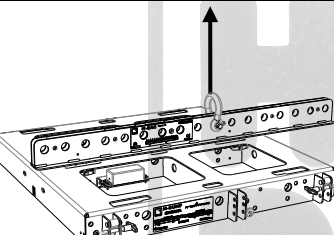
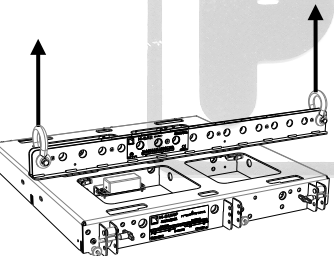
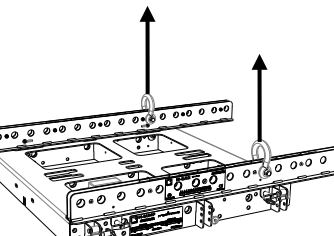


Site angle calculation

Refer to the modeling in **SOUNDVISION software** to determine the site angle of an array and the corresponding rigging option for the flying structure.

L-ACOUSTICS® recommends 5 different rigging options for the M-BUMP flying structure.

It is possible to use 0, 1 or 2 M-BAR, and 1 or 2 motor points. The orientation of the M-BAR when attaching it to the M-BUMP will determine if the configuration is in front or rear extension.

	<p>Option 1: 1 motor point</p> <ul style="list-style-type: none"> • 1 shackle at 3 possible positions (front, center, rear) • 3 discrete setting choices, for which the angle value depends on the number of enclosures.
	<p>Option 2: 2 motor points</p> <ul style="list-style-type: none"> • 2 shackles at fixed front and rear positions (spacing 400 mm/15 inch) <p>▶ Lock the front motor at the intended height for the array. ▶ Adjust the rear point height to achieve the intended site angle.</p>
	<p>Option 3: 1 motor point</p> <ul style="list-style-type: none"> • 1 shackle at a variable position (17 holes) • 1 M-BAR at 4 possible positions (rear or front extension, A or B) • 68 discrete setting choices, for which the angle value depends on the number of enclosures.
	<p>Option 4: 2 motor points</p> <ul style="list-style-type: none"> • 2 shackles at fixed front and rear positions (holes 0 and 16, spacing 900 mm/35 inch) • 1 M-BAR at 4 possible positions (rear or front extension, A or B) <p>▶ Lock the front motor at the intended height for the array. ▶ Adjust the rear point height to achieve the intended site angle.</p>
	<p>Option 5: 2 motor points</p> <ul style="list-style-type: none"> • 2 shackles at the same hole number (constant spacing 663 mm/26 inch) but a variable position (17 holes) • 2 M-BAR at 4 possible positions (rear or front extension, A or B) : • 68 discrete setting choices, for which the angle value depends on the number of enclosures.



Option 2 vs. Option 4

Both Option 2 and Option 4 offer a setting choice among a continuous range of angle values. Option 4 in rear extension enlarges the setting range for negative site angles. Option 4 in front extension enlarges the setting range for positive site angles.



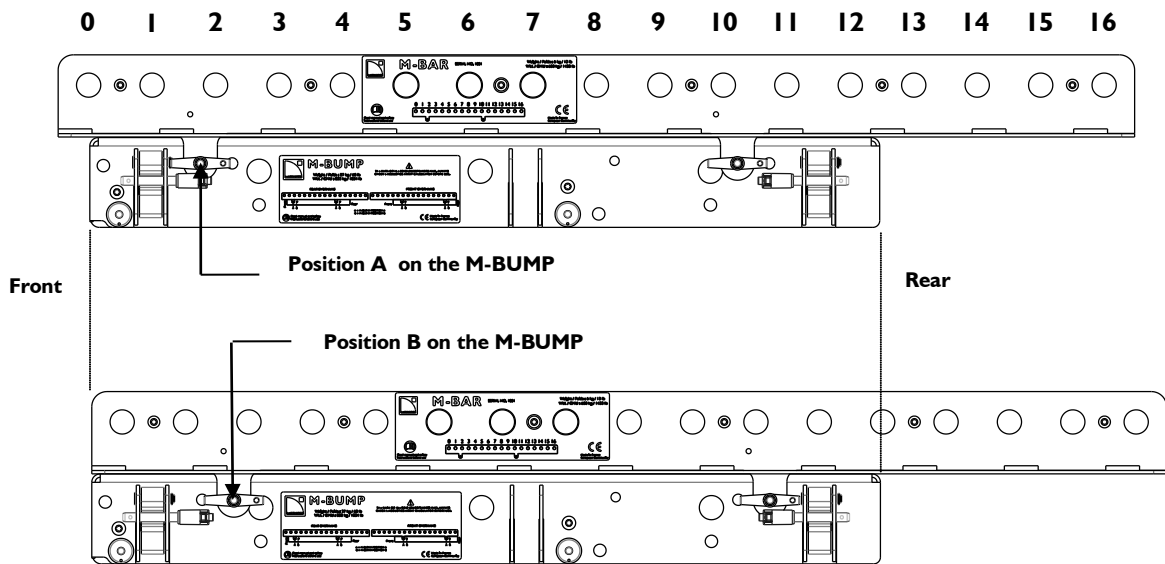
Front or rear extension in SOUNDVISION software

When modeling a system in SOUNDVISION software, the rear extension of any rigging frame is indicated by **inv** following the frame name in the **Global Settings** section of the **Loudspeaker Data** window.

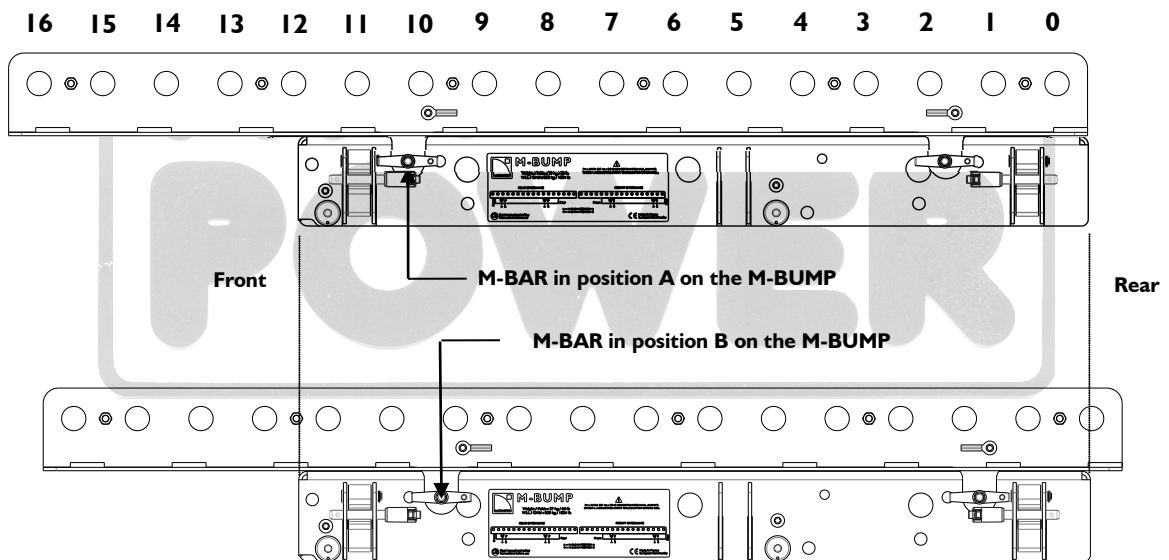
SB18 SUBWOOFER

RIGGING MANUAL

VERSION 2.0



M-BAR hole numbering (0 to 16) and positions (A or B) in the rear extension



M-BAR hole numbering (0 to 16) and positions (A or B) in the front extension

APPENDIX B: KARA-MINIBU FLYING OPTIONS



Site angle calculation

Refer to the modeling in **SOUNDVISION software** to determine the site angle of an array and the corresponding rigging option for the flying structure.

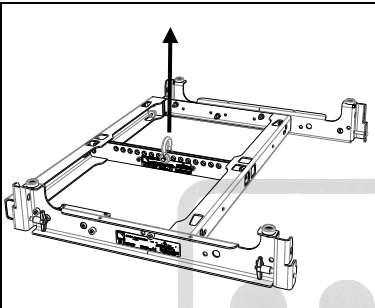
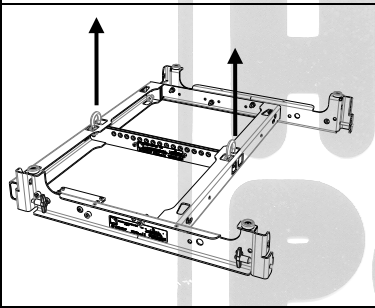


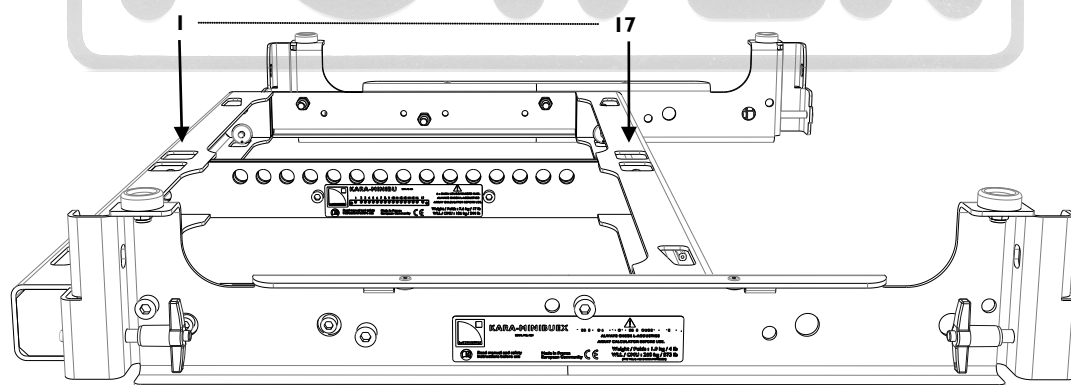
Rigging options for KARA-MINIBU as a flying structure

L-ACOUSTICS® recommends 4 different rigging options to fly SB18 or KARA arrays with the KARA-MINIBU. Option 1 and Option 2 are for KARA standalone array only and are not presented in this document.

In both rigging options allowing the flying of SB18 enclosures, KARA-MINIBU and KARA-MINIBUEX have to be assembled so as to form the flying structure.

The orientation of the whole structure when attaching it to the array will determine if the configuration is in front or rear extension.

	<p>Option 3: 1 motor point</p> <ul style="list-style-type: none"> • 1 shackle or CLAMP250, at a variable position (17 holes) • 2 rigging positions when attaching the structure to an enclosure (front or rear extension) • 34 discrete setting choices, for which the angle value depends on the number of enclosures • With an SB18 array, in any configuration, hole 15 will always provide the closest value to 0°.
	<p>Option 4: 2 motor points</p> <ul style="list-style-type: none"> • 2 shackles, at front and rear positions (holes 1 and 17, spacing 407 mm/16 inch) • 2 rigging positions when attaching the structure to an enclosure (front or rear extension) <p>▶ Lock the front motor at the intended height for the array. ▶ Adjust the rear point height to achieve the intended site angle.</p>



Hole numbering for KARA-MINIBU/KARA-MINIBUEX



Front or rear extension in SOUNDVISION software

When modeling a system in SOUNDVISION software, the rear extension of any rigging frame is indicated by **inv** following the frame name in the **Global Settings** section of the **Loudspeaker Data** window.

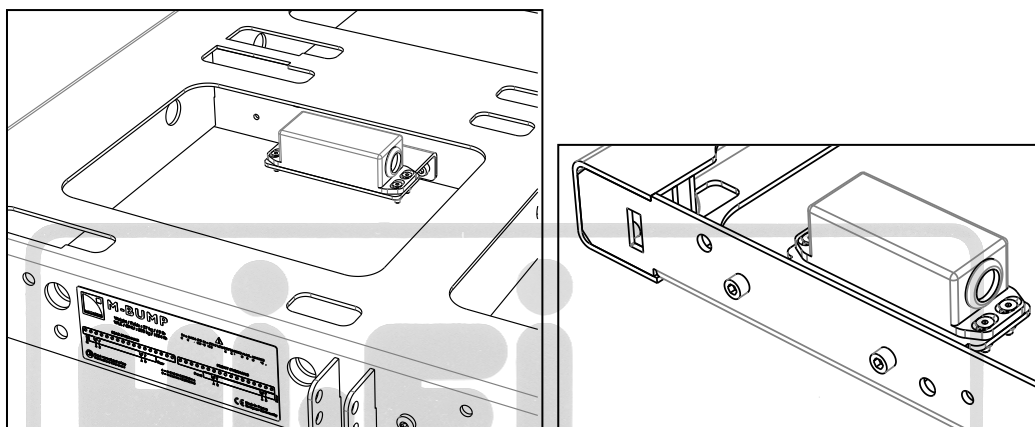
APPENDIX C: INSTALLING AN INCLINOMETER

A **laser support plate** has been integrated inside M-BUMP and KARA-MINIBU for optional inclinometer/laser device mounting. It is compatible with three inclinometer models: TEQSAS® LAP-TEQ PLUS (part of the **L-ACOUSTICS® TECH TOOLCASE** - refer to the **TECH TOOLCASE Product spec sheet**), TEQSAS® LAP-TEQ (legacy model) and KSG® RECLINE Compact.



LAP-TEQ / LAP-TEQ PLUS sensor and display compatibility

The legacy LAP-TEQ sensors are compatible with the new TEQSAS® LAP-TEQ PLUS displays. Conversely, the new sensors are **not** compatible with the legacy displays.



LAP-TEQ inclinometer installed on the M-BUMP (left) or the KARA-MINIBU (right)



Required material

Electric screwdriver with torque selector, T20 Torx® bit, 7 mm hex key

- 1 Put the M-BUMP or KARA-MINIBU with identification plate right-side up.
- 2 Undo the four Torx® bolts on the laser support plate (T20 bit, 7 mm hex key).
- 3 Place the sensor on the laser support plate with laser lens towards the front laser slit, verifying nothing obstructs the slit opening.
- 4 Drive the four Torx® bolts into the holes of the inclinometer and the plate (T20 bit, 7 mm hex key, 3 N.m / 27 in.lb).



Calibrating the inclinometer

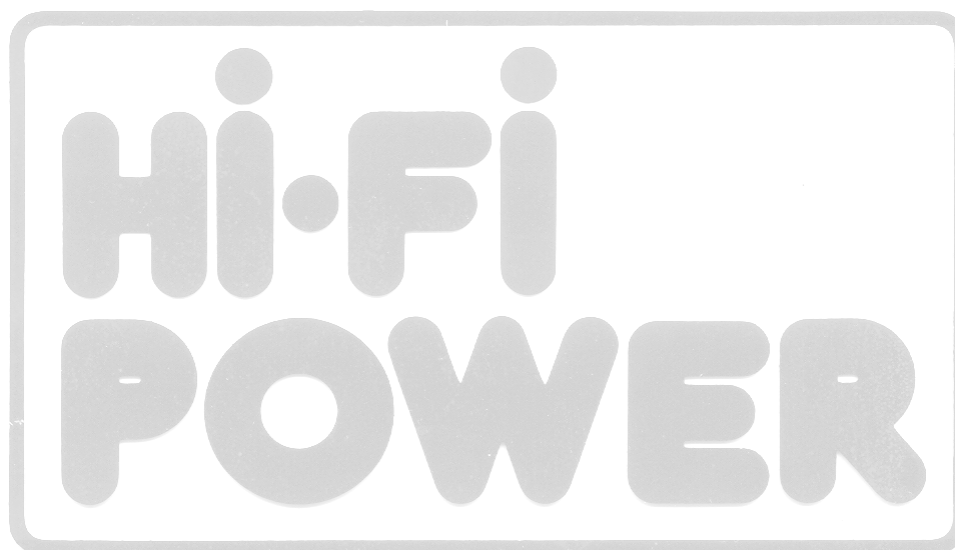
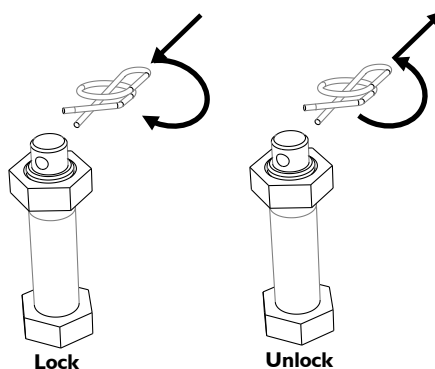
Refer to the manufacturer instructions. In addition to the handheld inclinometer available in the TOOLCASE, an XLR cable is needed.

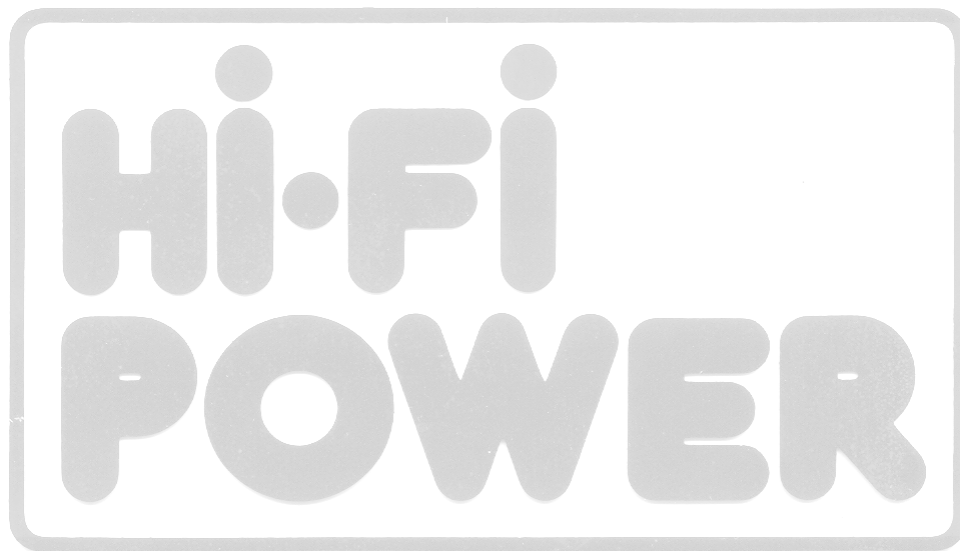
APPENDIX D: SAFETY PIN MECHANISM ON SHACKLES



Securing the shackle

ALWAYS put the safety pin in locked position to secure an assembly

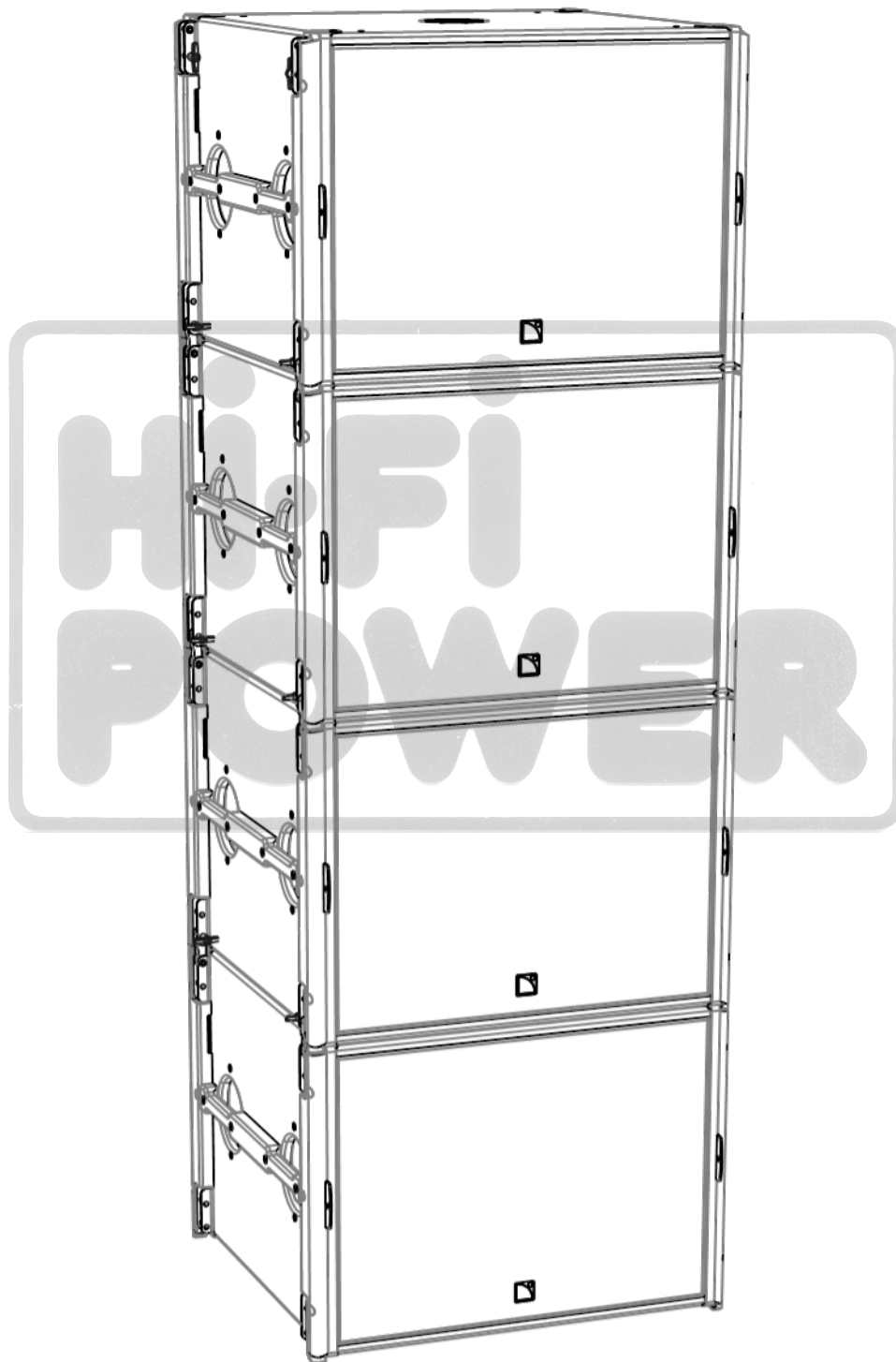




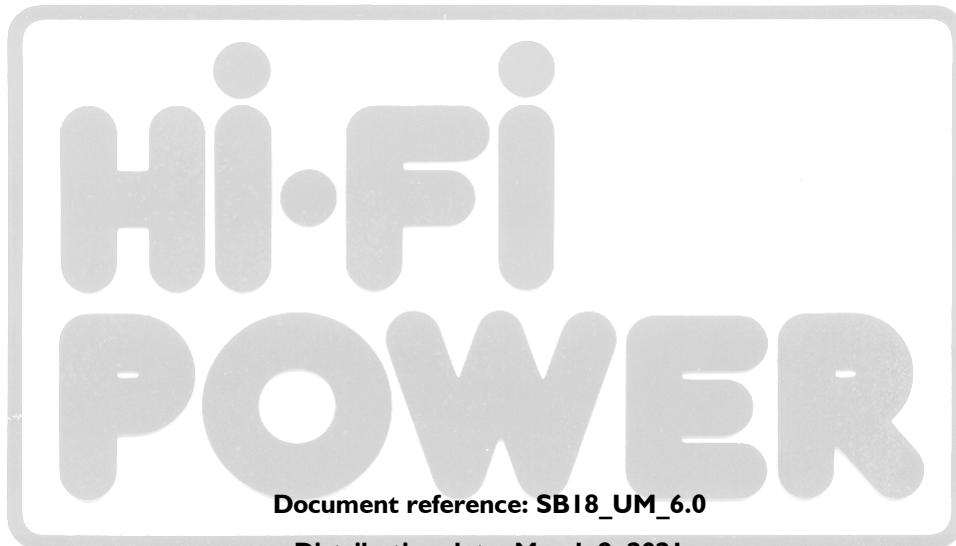
SB 18 (i/m)



user manual (EN)



SB18 / SB18i / SB18m SUBWOOFER
USER MANUAL
VERSION 6.0



Document reference: SB18_UM_6.0

Distribution date: March 9, 2021

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SAFETY INSTRUCTIONS

1. **Read this manual**
2. **Follow all SAFETY INSTRUCTIONS as well as DANGER and OBLIGATION warnings**
3. **Never incorporate equipment or accessories not approved by L-ACOUSTICS®**
4. **Read all the related PRODUCT INFORMATION documents before exploiting the system**
The product information document is included in the shipping carton of the related system component.
5. **Read the RIGGING MANUAL before installing the system**
Use the rigging accessories described in the rigging manual and follow the associated procedures
6. **Beware of sound levels**
Do not stay within close proximity of loudspeakers in operation and consider wearing earplugs. Loudspeaker systems are capable of producing very high sound pressure levels (SPL) which can instantaneously lead to permanent hearing damage to performers, production crew and audience members. Hearing damage can also occur with prolonged exposure to sound: 8 h at 90 dB(A), 30 min at 110 dB(A), less than 4 min at 130 dB(A).

SYMBOLS

The following symbols are used in this document:

-  **DANGER**
This symbol indicates a potential risk of harm to an individual or damage to the product. It can also notify the user about instructions that must be strictly followed to ensure safe installation or operation of the product.
-  **ELECTRICAL HAZARD**
This symbol indicates a potential risk of electrical injury. It can also notify the user about instructions that must be strictly followed to ensure safe installation or operation of the product.
-  **OBLIGATION**
This symbol notifies the user about instructions that must be strictly followed to ensure proper installation or operation of the product.
-  **INFORMATION**
This symbol notifies the user about complementary information or optional instructions.

SB18 / SB18i / SB18m SUBWOOFER

USER MANUAL

VERSION 6.0

WELCOME TO L-ACOUSTICS®

Thank you for choosing the L-ACOUSTICS® SB18 system.

This document contains essential information on using the system properly. Carefully read this document in order to become familiar with the system.

As part of a continuous evolution of techniques and standards, L-ACOUSTICS® reserves the right to change the specifications of its products and the content of its document without prior notice.

Please check the L-ACOUSTICS® web site on a regular basis to download the latest document and software updates: www.l-acoustics.com.

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SB18 SUBWOOFER ENCLOSURE

The SB18 is the recommended subwoofer for modular WST® line sources and coaxial enclosures. It allows extending the operating frequency range of the system down to 32Hz.

The SB18 features one 18" neodymium speaker in a dual bass-reflex tuned enclosure. It provides impact, sensitivity, low thermal compression and reduced distortion. One of the vents features a progressive profile allowing laminar airflow and reduced turbulence noise, even at the highest operating levels. These combined properties contribute to the sonic qualities of the SB18 in terms of precision and musicality. The cabinet is made of first grade Baltic birch plywood to ensure maximum acoustical and mechanical integrity.

A 4-point rigging system is integrated into the cabinet and allows SB18 subwoofers to be flown or ground-stacked, as a standalone array or within a vertical SB18 / Kara (II) array. The cabinet also features a pole mount socket for XT / X or Kiva (II) enclosures.

The SB18 is driven and amplified by the LA4X, LA8 or LA12X controller. These ones ensure linearization, protection and optimization for the loudspeaker system in its different configurations, cardioid included.



SB18 / SB18i / SB18m

In this document, the SB18 term and illustration will refer equally to SB18, SB18i or SB18m. These products are different versions of the same subwoofer and share the same operating modes, presets and recommended configurations. The rigging system of each version has been designed to be compatible with a distinct main system: SB18 with Kara (II), SB18i with Karai and SB18m with ARCS® Focus/Wide. All SB18 versions feature a pole mount socket for use with XT/X, Kiva (II) or ARCS® Focus/Wide.

SB18 / SB18i / SB18m SUBWOOFER

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1 SYSTEM COMPONENTS

The system approach developed by L-ACOUSTICS® consists in offering a global solution that guarantees the highest and most predictable level of performance at any step of loudspeaker system deployment: modeling, installation, and operation. A complete L-ACOUSTICS® system includes enclosures, amplified controllers, cables, rigging system and software applications.

1.1 Loudspeaker enclosure

SB18 Subwoofer enclosure, down to 32 Hz.



Loudspeaker system design

Sound design aspects are beyond the scope of this document. However, the various applications of the system will be based on the loudspeaker configurations presented in this document.

1.2 Powering and driving system

LA4, LA4X, LA8, LA12X	Amplified controller with DSP, preset library and networking capabilities
LA-RAK	Touring rack containing three LA8, for mains, audio signals and network distribution
LA-RAK II AVB	Touring rack containing three LA12X, for mains, audio signals and network distribution



Operating instructions

Refer to the **LA4, LA4X, LA8, LA12X, LA-RAK or LA-RAK II AVB manuals**.

1.3 Loudspeaker cables

DO cables (DO.7, DO10, DO25)	8-point PA-COM® loudspeaker cables (4 mm ² section). Respective lengths of 0.7 m/2.3 ft, 10 m/32.8 ft, and 25 m/82 ft.
DOSUB-LA8	Breakout cable for four passive enclosures. 8-point PA-COM® to 4 × 2-point speakON® (4 mm ² section).
DO3WFILL	Breakout cable for one 2-way active enclosure and two passive enclosures 8-point PA-COM® to 2 × 2-point speakON® and 1 × 4-point speakON® (4 mm ² section).
SP cables (SP.7, SP5, SP10, SP25)	4-point speakON® loudspeaker cables (4 mm ² section). Respective lengths of 0.7 m/2.3 ft, 5 m/16.4 ft, 10 m/32.8 ft and 25 m/82 ft.
SP-Y1	Breakout cable for two passive enclosures. 4-point speakON® to 2 × 2-point speakON® (2.5 mm ² section). Provided with CC4FP adapter.



Information about the connection of the enclosures to the LA amplifiers is given in this document. Refer to the **LA4, LA4X, LA8, LA12X, LA-RAK or LA-RAK II AVB manuals** for detailed instructions about the whole cabling scheme, including modulation cables and network.

1.4 Rigging element



Rigging elements or procedures are not presented in this document. According to the version of the subwoofer and the system to set-up, refer to the applicable rigging manual.

1.5 Software application

SOUNDVISION	Proprietary acoustical and mechanical 3D modeling software.
LA NETWORK MANAGER	Remote control and monitoring of amplified controllers



Using L-ACOUSTICS® software

Refer to the **SOUNDVISION user manual** and the **LA NETWORK MANAGER tutorial**.



SB18



LA-RAK



LA4



LA4X



LA8



DOSUB-LA8



DO.7



SPY1



SP.7



DO10



SP5



DO3WFILL



DO25



SP10



SP25



Soundvision



LA Network Manager

SB18 system components (excluding rigging elements and modulation cables)

SB18 / SB18i / SB18m SUBWOOFER

USER MANUAL

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2 LOUDSPEAKER CONFIGURATIONS

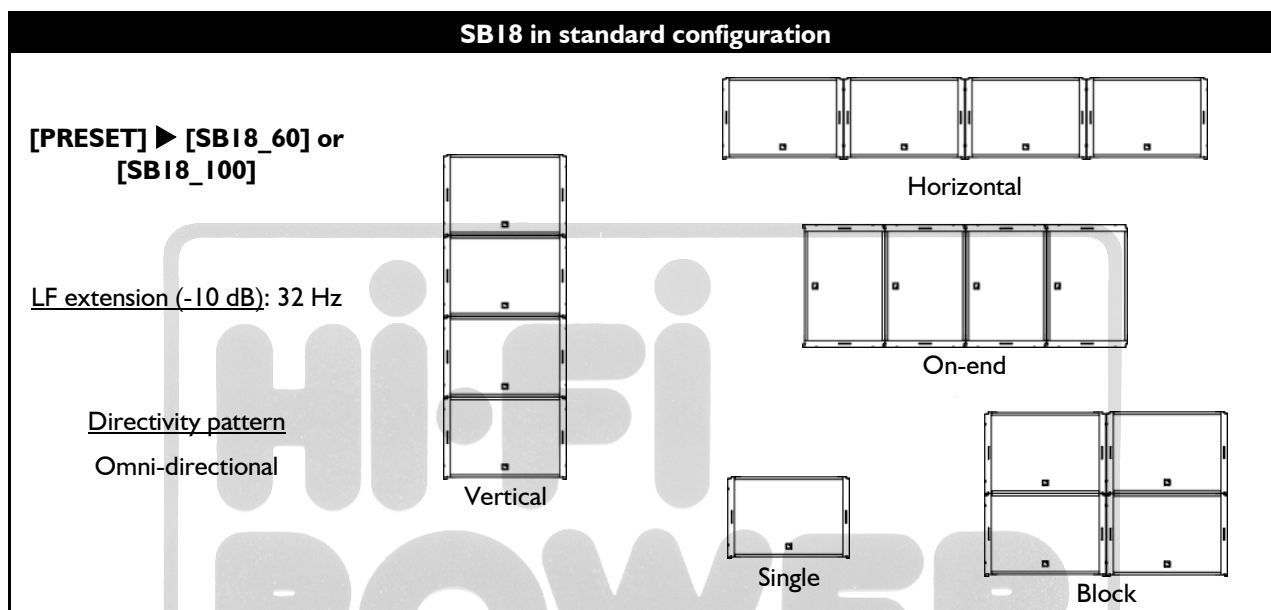
2.1 Standard configuration

The standard configuration corresponds to the use of subwoofers as single elements or as standard subwoofer arrays. In this configuration the system operates with an omni-directional directivity pattern.

The [SB18_60] preset offers a 60 Hz upper frequency limit.

The [SB18_100] preset offers a 100 Hz upper frequency limit.

The SB18 subwoofers are driven by the LA4, LA4X, LA8, or LA12X amplified controllers.



Delay settings

When combining a line source with subwoofers, delays may have to be added to the presets. Refer to the **PRESET GUIDE** to obtain the pre-alignment delay values.

Distance between enclosures

Place the subwoofer enclosures side by side.

If not possible, the maximum distance between two adjacent acoustic centers must be:

- 1.7 m with [SB18_100]
- 2.80 m for [SB18_60]

2.2 Cardioid configuration

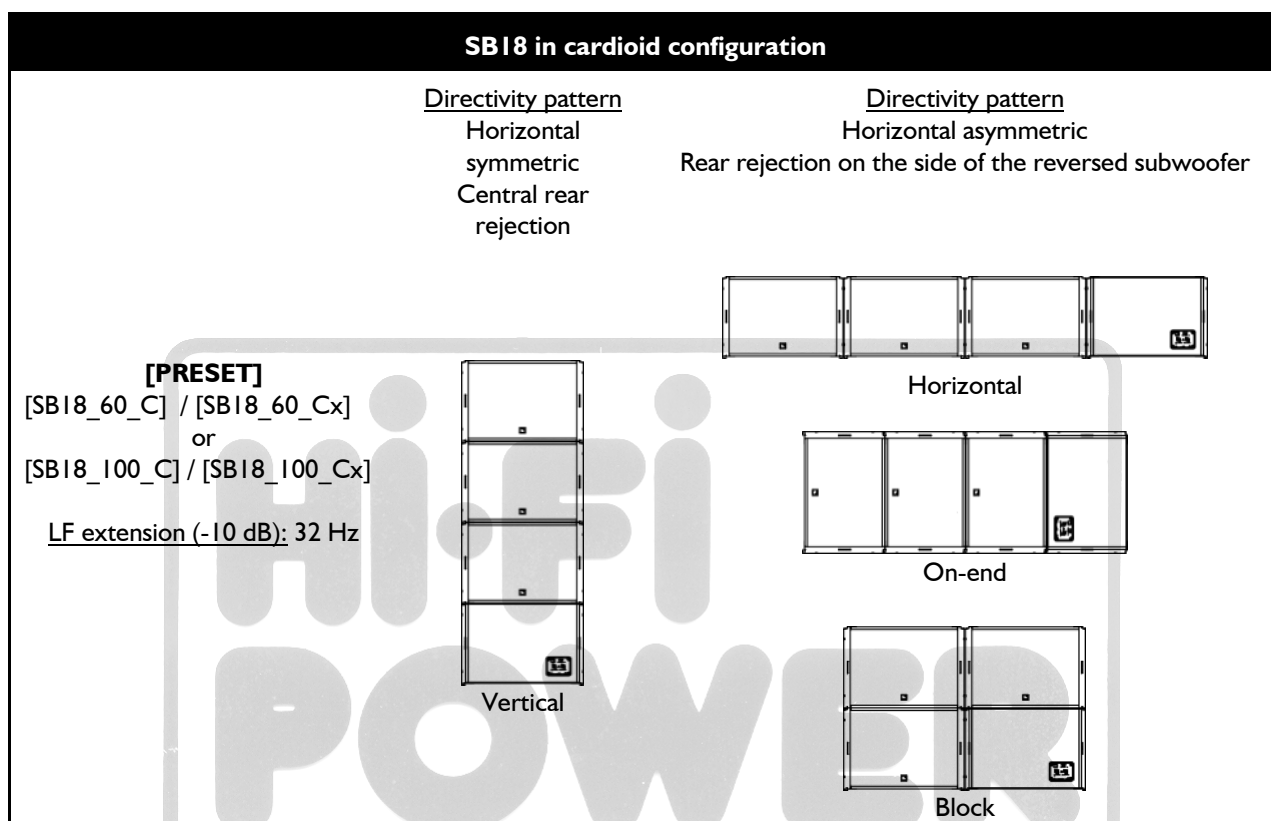
The cardioid configuration corresponds to the use of subwoofers as cardioid subwoofer arrays. In this configuration, the system produces a rear SPL rejection. Refer to the **Cardioid configurations** technical bulletin.

The [SB18_60_C] / [SB18_60_Cx] presets feature a 60 Hz upper frequency limit.

The [SB18_100_C] / [SB18_100_Cx] presets feature a 100 Hz upper frequency limit.

They both feature delay settings optimized for cardioid SB18 arrays.

The SB18 subwoofers are driven by the LA4, LA4X or LA8 amplified controllers.



Delay settings

When combining a line source with subwoofers, delays may have to be added to the presets. Refer to the **PRESET GUIDE** to obtain the pre-alignment delay values.



Distance between enclosures

Place the subwoofer enclosures side by side.

If not possible, the maximum distance between two adjacent acoustic centers must be:

- 1.7 m with [SB18_100_C] / [SB18_100_Cx]
- 2.8 m for [SB18_60_C] / [SB18_60_Cx]

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3 LOUDSPEAKER CONNECTION

3.1 Connectors



The SB18 subwoofer is equipped with two 4-point speakON® connectors.

The IN connector allows receiving the audio signal and the LINK connector allows routing it to another SB18 enclosure in parallel.



The SB18 connection in parallel is only possible with the LA8 or LA12X amplified controller.



Internal pinout for L-ACOUSTICS® subwoofers enclosures

speakON® points	1+	1-	2+	2-
Transducer connectors	LF +	LF -	Not used	Not used

3.2 Connection to LA4 / LA4X



Maximum of 4 enclosures per LA4 / LA4X

1 SB18 can be connected to each output channel on the LA4. Therefore, a single LA4 amplified controller can drive up to 4 enclosures.



Cardioid configuration

Connect the reversed subwoofer to OUT 1 to use the cardioid preset.



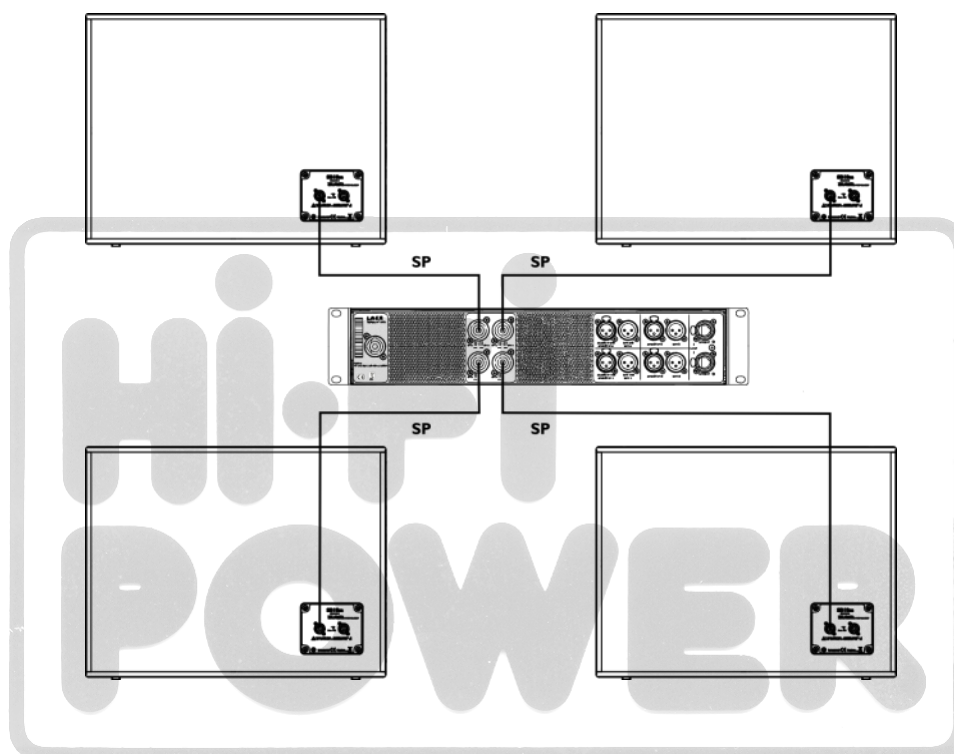
Impedance load

8 Ω for 1 SB18.

To connect the SB18 to the LA4 / LA4X, 2 options are available.

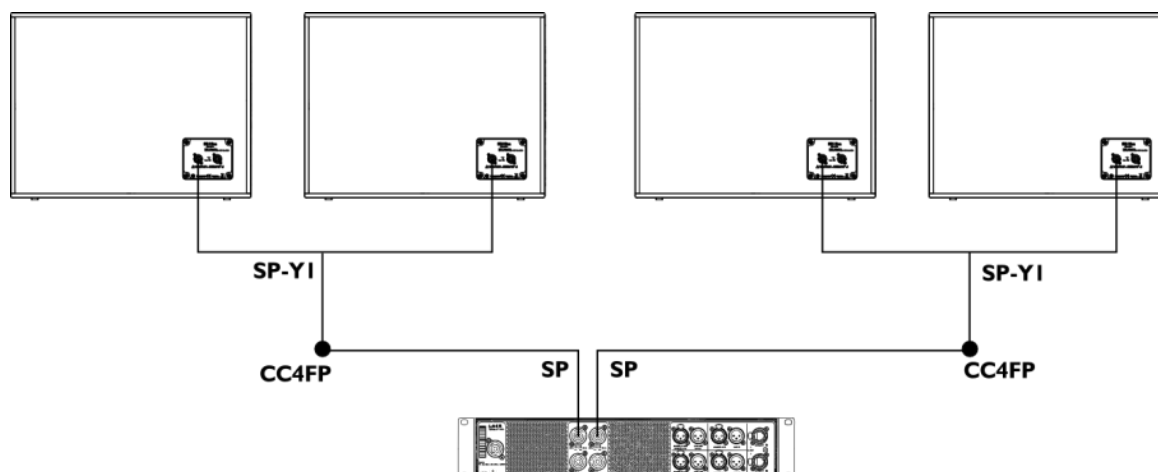
Option A

- Use **SP cables** (SP.7, SP5, SP10 or SP25) to connect one enclosure to each of the four LA4 / LA4X output channels.



Option B

- Connect an **SP cable** (SP.7, SP5, SP10 or SP25) to the OUT1/OUT2 and OUT3/OUT4 connectors of the LA4 / LA4X.
- Use a **CC4FP adapter** to connect an **SP-YI cable** and separate the two output channels.
- Apply the same cabling scheme for the OUT3/OUT4 connector.



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3.3 Connection to LA8



Maximum of 6 enclosures per LA8

LA8 can drive up to 2 SB18 per output, but no more than 6 per controller at high level.



Cardioid configuration

Connect the reversed subwoofers to OUT 1 to use the cardioid preset.



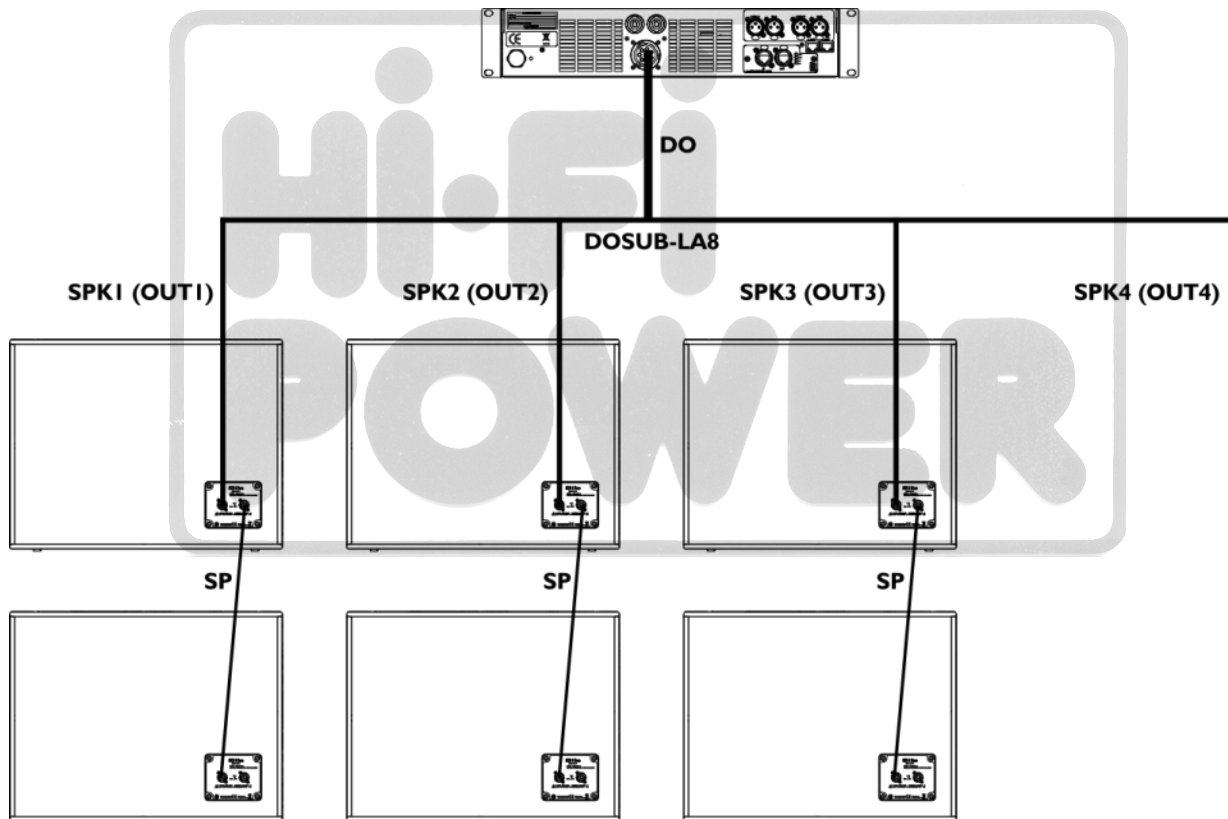
Impedance load

8 Ω for 1 enclosure, 4 Ω for 2 enclosures.

To connect the SB18 to the LA8, 2 options are available.

Option A

- ▶ Connect a **DO cable** (DO.7, DO10 or DO25) to the LA8 PA-COM[®] connector
- ▶ Use the **DOSUB-LA8** to separate the four output channels.
- ▶ If necessary, use **SP cables** to connect additional SB18 enclosures in parallel with the first ones.

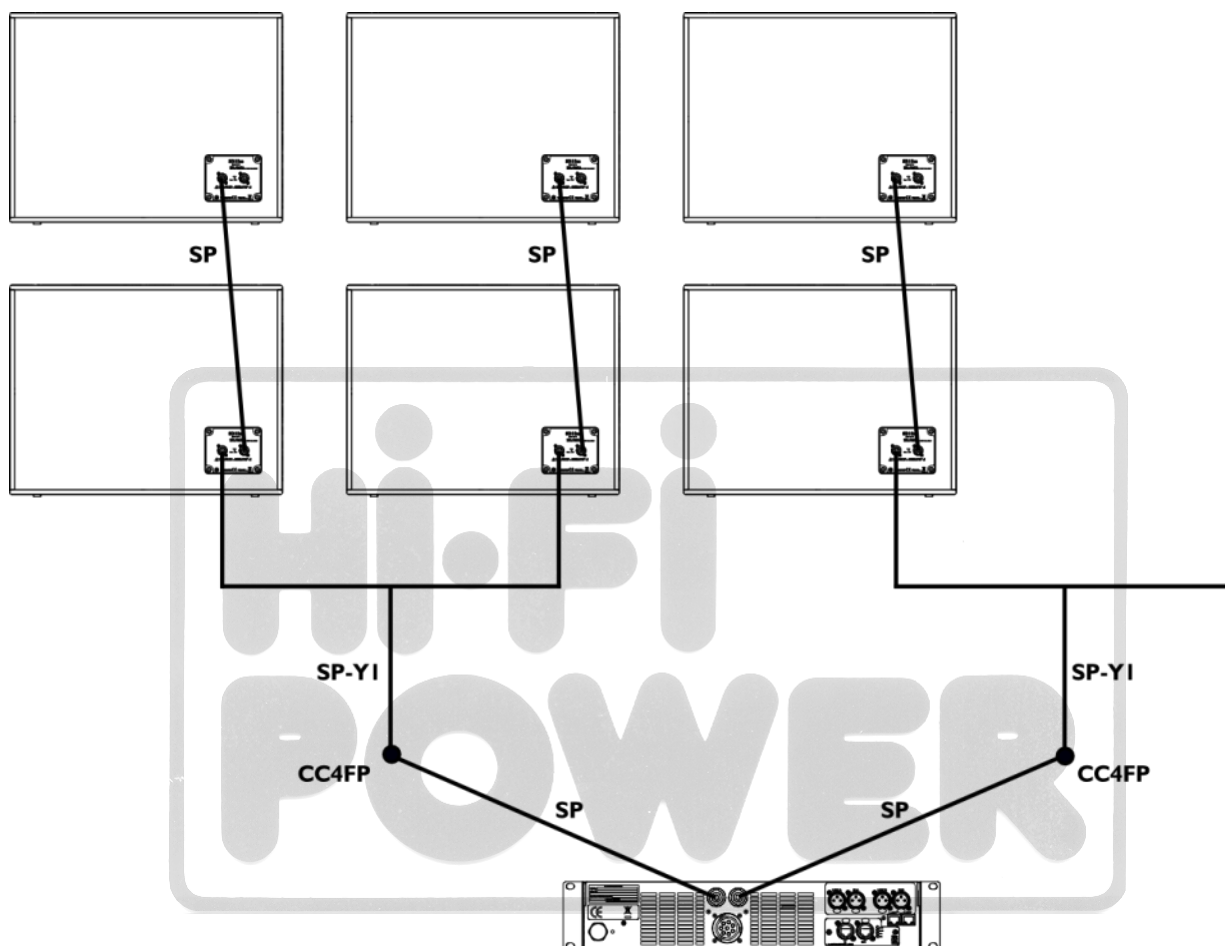


Option B



With various enclosure types connected to the same amplifier, this cabling scheme needs a custom preset.

- ▶ Connect an **SP** cable (SP.7, SP5, SP10 or SP25) to the OUT1/OUT2 and OUT3/OUT4 LA8 speakON® connectors.
- ▶ Use a **CC4FP adapter** to connect an **SP-YI** cable and separate the two output channels.
- ▶ If necessary, use **SP cables** to connect additional similar enclosures in parallel with the first ones.



3.4 Connection to LA12X



Refer to the **Amplification reference** technical bulletin for the latest information on compatibility with amplified controllers and cabling schemes for all enclosure types.

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APPENDIX A PRESET DESCRIPTION

[SB18_60] or [SB18_100]

The [SB18_60] preset provides the subwoofer enclosures with an upper frequency limit at 60 Hz.

The [SB18_100] preset provides the subwoofer enclosures with an upper frequency limit at 100 Hz.

It is used for SB18 subwoofers deployed as single elements or arrays in standard configuration.

Loudspeaker elements	Amplifier outputs	Channels	Default parameters				
			Routing	Gain	Delay	Polarity	Mute
SB18	OUT 1	SB	IN A	0 dB	0 ms	+	ON
SB18	OUT 2	SB	IN A	0 dB	0 ms	+	ON
SB18	OUT 3	SB	IN B	0 dB	0 ms	+	ON
SB18	OUT 4	SB	IN B	0 dB	0 ms	+	ON

[SB18_60_C] / [SB18_60_Cx] or [SB18_100_C] / [SB18_100_Cx]

The [SB18_60_C] / [SB18_60_Cx] presets provide the subwoofer enclosures with an upper frequency limit at 60 Hz.

The [SB18_100_C] / [SB18_100_Cx] presets provide the subwoofer enclosures with an upper frequency limit at 100 Hz.

They both feature optimized delay settings for subwoofers deployed arrays in cardioid configuration.

Loudspeaker elements	Amplifier outputs	Channels	Default parameters				
			Routing	Gain	Delay	Polarity	Mute
Reversed SB18	OUT 1	SR	IN A	0 dB	0 ms	+	ON
SB18	OUT 2	SB					ON
SB18	OUT 3	SB					ON
SB18	OUT 4	SB					ON

APPENDIX B RECOMMENDATION FOR SPEAKER CABLES



Cable quality and resistance

Only use high-quality fully insulated speaker cables made of stranded copper wire.

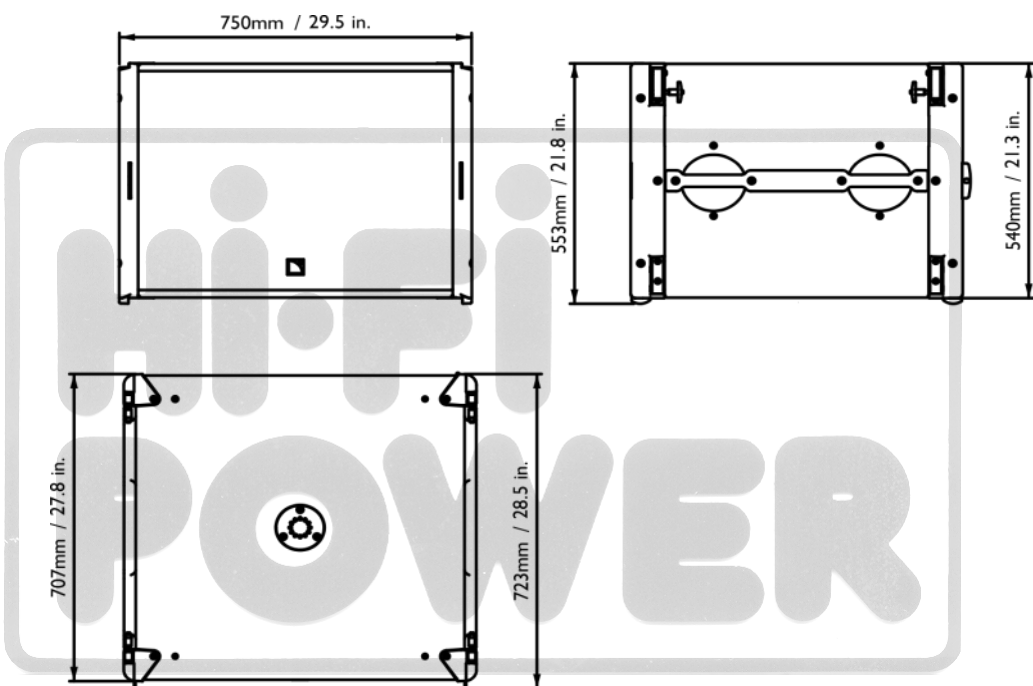
Use cables of gauge offering low resistance per unit length and keep the cables as short as possible.

The following table provides the recommended maximum length depending on the cable cross-section and on the impedance load connected to the amplifier.

Cable cross-section			Recommended maximum length					
			8 Ω load		4 Ω load		2.7 Ω load	
mm ²	SWG	AWG	m	ft	m	ft	m	ft
2.5	15	13	30	100	15	50	10	33
4	13	11	50	160	25	80	17	53
6	11	9	74	240	37	120	25	80
10	9	7	120	390	60	195	40	130

APPENDIX C SPECIFICATIONS

SB18

Description	Subwoofer enclosure, amplified by LA4X / LA8 / LA12X	
Low frequency limit (-10 dB)	32 Hz ([SB18_100] preset)	
Maximum SPL¹	138 dB ([SB18_100] preset)	
Transducers	1 × 18" weather-resistant, direct radiation, dual bass-reflex	
Nominal impedance	8 Ω	
Connectors	IN: 1 × 4-point speakON®	LINK: 1 × 4-point speakON®
Rigging components	Integrated pole-mount socket Integrated rigging system Handles integrated into the cabinet	
Dimensions		
Physical data	Weight (net):	52 kg / 115 lb
	Cabinet:	Baltic birch plywood
	Finish:	Dark Grey brown (Pantone 426C)
	Front:	Steel grill with anti-corrosion coating Airnet® acoustically neutral fabric
	Protection rating	IP55
	Rigging components:	Steel with anti-corrosion coating

¹ Peak level measured at 1 m under half-space conditions using pink noise with crest factor 4 (preset specified in brackets).

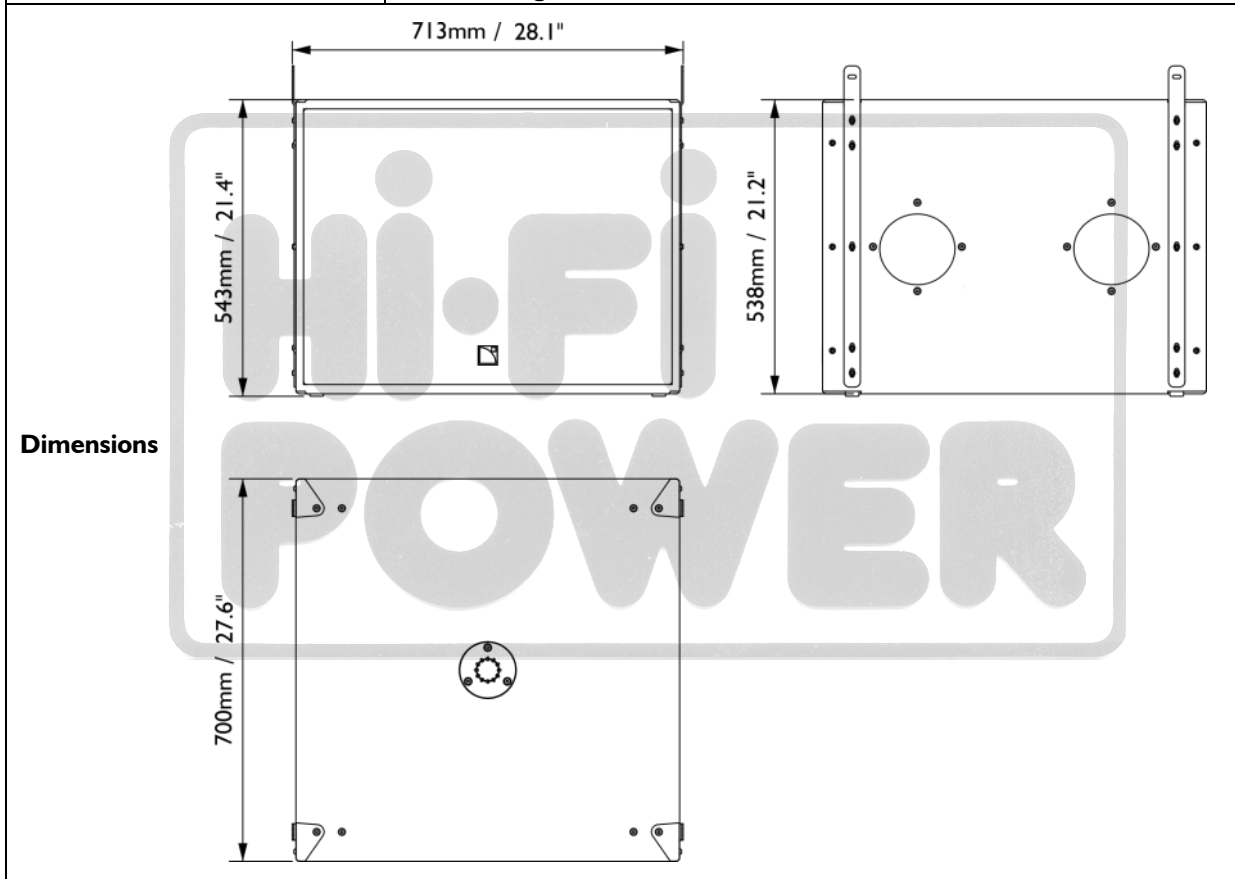
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SB18i

Description	Subwoofer enclosure, amplified by LA4X / LA8 / LA12X, for permanent install	
Low frequency limit (-10 dB)	32 Hz ([SB18_100] preset)	
Maximum SPL¹	138 dB ([SB18_100] preset)	
Transducers	1 × 18" weather-resistant, direct radiation, dual bass-reflex	
Nominal impedance	8 Ω	
Connectors	IN: 1 × 4-point speakON®	LINK: 1 × 4-point speakON®
Rigging components	Integrated pole-mount socket Integrated rigging system Handles integrated into the cabinet	

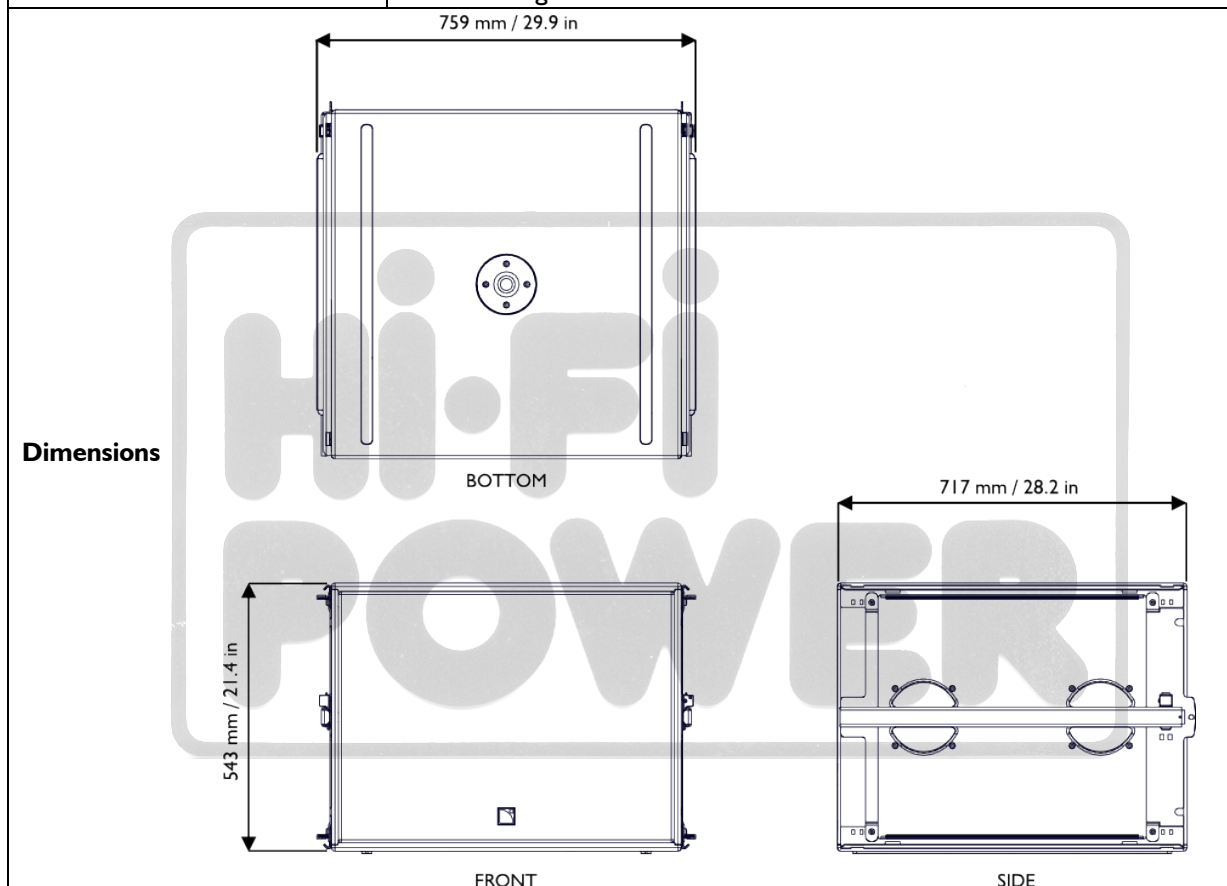


Physical data	Weight (net):	52 kg / 115 lb
	Cabinet:	Baltic birch plywood
	Finish:	Dark Grey brown (Pantone 426C) Custom RAL code on special order
	Front:	Steel grill with anti-corrosion coating Airnet® acoustically neutral fabric
	Protection rating	IP55
	Rigging components:	Steel with anti-corrosion coating

¹ Peak level measured at 1 m under half-space conditions using pink noise with crest factor 4 (preset specified in brackets).

SB18m

Description	Subwoofer enclosure, amplified by LA4X / LA8 / LA12X	
Low frequency limit (-10 dB)	32 Hz ([SB18_100] preset)	
Maximum SPL¹	138 dB ([SB18_100] preset)	
Transducers	1 × 18" weather-resistant, bass-reflex	
Nominal impedance	8 Ω	
Connectors	IN: 1 × 4-point speakON®	LINK: 1 × 4-point speakON®
Rigging components	Integrated pole-mount socket Captive coupling bars Handles integrated into the cabinet	



Physical data	Weight (net):	62 kg / 137 lb
	Cabinet:	Baltic birch plywood
	Finish:	Dark Grey brown (Pantone 426C) Custom RAL code on special order
	Front:	Steel grill with anti-corrosion coating Airnet® acoustically neutral fabric
	Protection rating:	IP55
	Rigging components:	Steel with anti-corrosion coating

¹ Peak level measured at 1 m under half-space conditions using pink noise with crest factor 4 (preset specified in brackets).



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