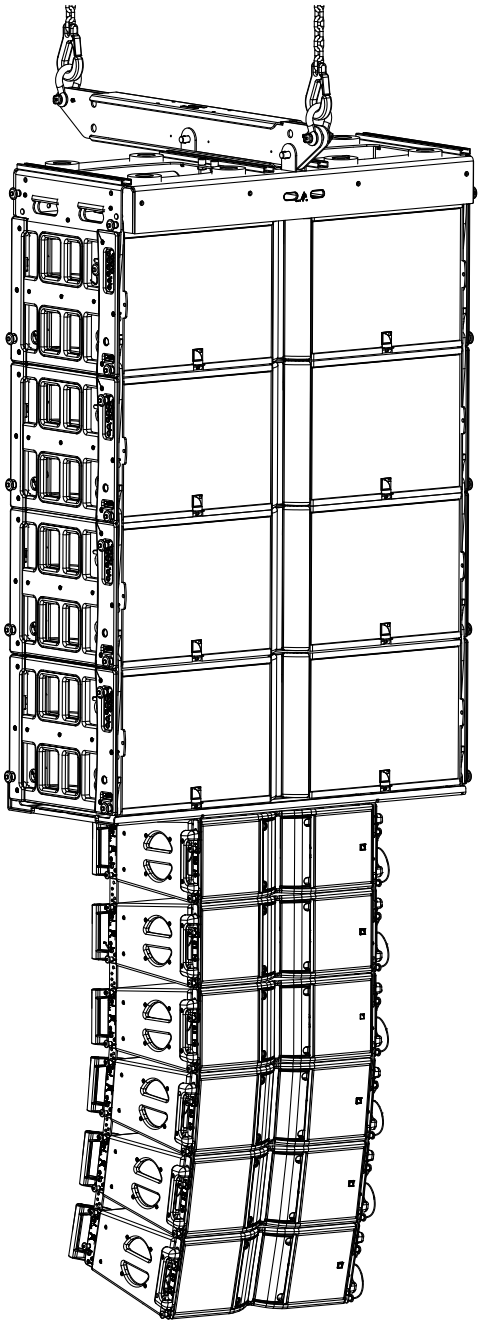
KARA II DOWNFILL FOR K1

addendum (EN)



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Contents

Safety

Instructions

Inspect the system before any deployment.

Perform safety related checks and inspections before any deployment.

Perform preventive maintenance at least once a year.

Refer to the preventive maintenance section for a list of actions and their periodicity.

Insufficient upkeep of the product can void the warranty.

Never incorporate equipment or accessories not approved by L-Acoustics.

Read all the related PRODUCT INFORMATION documents shipped with the products before exploiting the system.

Do not store the product on an unstable cart, stand, tripod, bracket, or table.

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.

Ensure personnel health and safety

During installation and set-up personnel must wear protective headgear and footwear at all times. Under no circumstances is personnel allowed to climb on a loudspeaker assembly.

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.

Respect the maximum configurations and the recommended safety precautions.

For safety issue, respect the maximum configurations outlined in this manual. To check the conformity of any configuration in regards with the safety precautions recommended by L-Acoustics, model the system in Soundvision and refer to the warnings in Mechanical Data section.

Be cautious when flying a loudspeaker configuration.

Before installing/raising the product, check each individual element to make sure that it is securely fastened to the adjacent element. Always verify that no one is standing underneath the product when it is being installed/raised. Never leave the product unattended during the installation process.

As a general rule, L-Acoustics recommends the use of secondary safety at all times.

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.

Risk of falling objects

Verify that no unattached items remain on the product or assembly.

Risk of tipping

Remove all rigging accessories before transporting a product or an assembly.

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 product or the assembly.

Intended use

This system is intended for use by trained personnel for professional applications.

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 documents without prior notice.

Check www.l-acoustics.com on a regular basis to download the latest document and software updates.

Long term exposure to extreme conditions may damage the product.

For more information, refer to the **Products weather protection** document, available on the website.

This marking indicates that this product should not be disposed of with other household waste throughout the EU. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or contact the retailer where the product was purchased. They can take this product for environmentally safe recycling.

Symbols

The following symbols are used in this document:

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.

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

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

Introduction

How to use this addendum

What is an addendum?

An addendum is an additional part of a documentation. This addendum complements the K1 user and rigging manuals. It contains updated content following the introduction of Kara II.

K1 with Kara II

Kara II, like Kara, can be used as downfill element under a K1 array. This addendum deals with the mechanical and electro-acoustical aspects of this configuration:

- Electro-acoustical description (p.6)
- Loudspeaker configurations (p.7)
- Rigging system description (p.11)
- Rigging procedures (p.14)

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Electro-acoustical description

Preset description

[K1]

loudspeaker elements	outputs	channels	routing	gain	delay	polarity	mute
left LF	OUT 1	LF	IN A	0 dB	0 ms	+	ON
right LF	OUT 2	LF					ON
MF	OUT 3	MF					ON
HF	OUT 4	HF					ON

[KARAIIDOWNK1]

loudspeaker elements	outputs	channels	routing	gain	delay	polarity	mute
LF	OUT 1	LF	IN A	0 dB	0 ms	+	ON
HF	OUT 2	HF					ON
LF	OUT 3	LF	IN A	0 dB	0 ms	+	ON
HF	OUT 4	HF					ON

[K1SB_X]

outputs	channels	routing	gain	delay	polarity	mute
OUT 1	SB	IN A	0 dB	0 ms	+	ON
OUT 2	SB	IN A	0 dB	0 ms	+	ON
OUT 3	SB	IN A	0 dB	0 ms	+	ON
OUT 4	SB	IN A	0 dB	0 ms	+	ON

Loudspeaker configurations

Line source

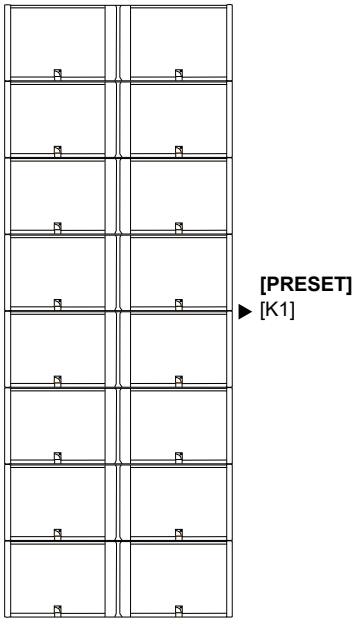
Deployed as a line source, the system operates over the nominal bandwidth of the K1 enclosure.

Two configurations are possible:

- K1 line source
- K1/K1-SB line source: enhanced LF throw

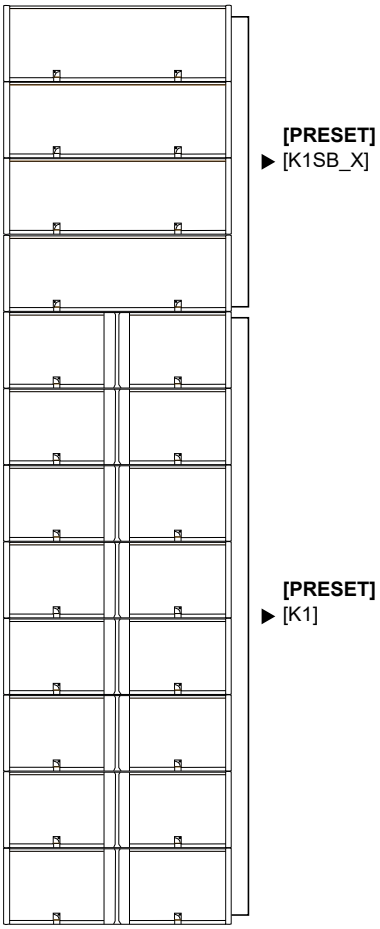
By providing the K1-SB with the same frequency response as the K1 low section, the [K1SB_X] preset allows the K1-SB enclosure to be used as an LF line source element, increasing the length of the sub-low line source.

The K1 and K1-SB enclosures are driven by the LA8 / LA12X amplified controllers.



Standalone K1 line source

Enclosure	K1
Preset	[K1]
Frequency range (-10 dB)	35 Hz - 20 kHz



K1/K1-SB line source

Enclosure	K1	K1-SB
Preset	[K1]	[K1SB_X]
Frequency range (-10 dB)	35 Hz - 20 kHz	
Recommended ratio	2 K1 : 1 K1-SB	
Minimum line length	8 K1 + 4 K1-SB	

When using [K1] with [K1SB_X], do not add any delay value between the K1 and K1-SB elements of a same line source.

Additional downfill element

All K1 system configurations can be combined with an additional Kara II or K2 line source downfill system. This allows an extension of the vertical coverage to the closer audience.

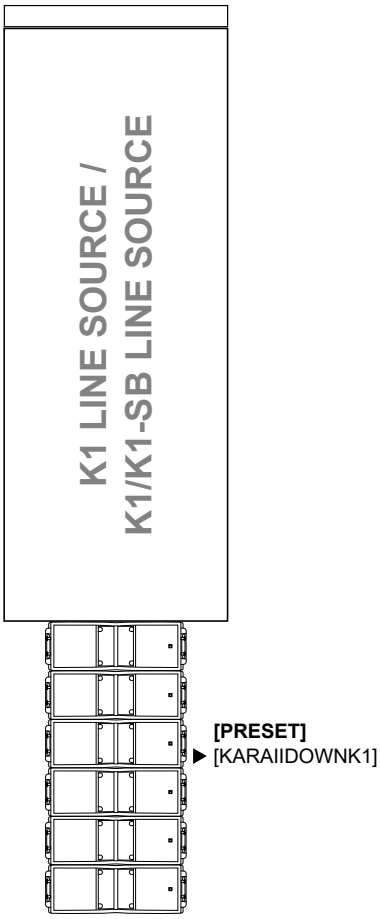
This documentation is about Kara II downfill only.
Refer to the **K1 user documentation** for more information on K2 downfill configuration.

Kara II

The [KARAIIDOWNK1] preset features a high-pass filter at 55 Hz for the low section, along with specific delay settings, in order to optimize the acoustic coupling between the Kara II and K1 line sources.

The Kara II enclosure is driven by the LA4X / LA8 / LA12X amplified controllers.

The [KARAIIDOWNK1] preset is optimized for a **110°** fins setting on Kara II.



Line source with Kara II downfill system

Enclosure	K1	K1-SB in line source	Kara II
Preset	[K1]	[K1SB_X]	[KARAIIDOWNK1]
Frequency range (-10 dB)	35 Hz - 20 kHz		
Kara II array	Up to 6 Kara II enclosures		

Do not add any delay between the K1 and Kara II elements of a mixed line source.

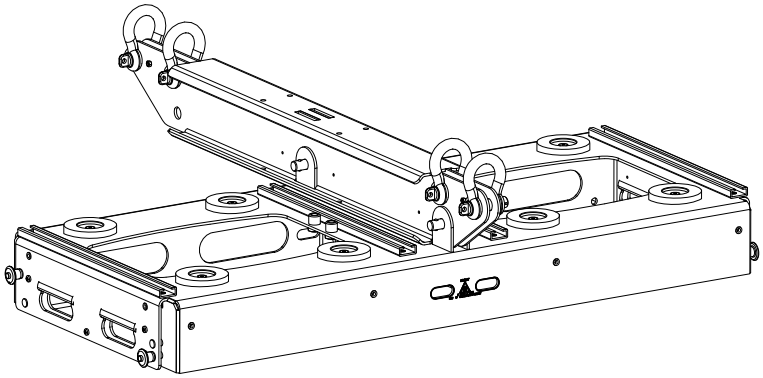
When using [K1] with [K1SB_X], do not add any delay value between the K1 and K1-SB elements of a same line source.

Using the Kara / Kara II system
Refer to the **Kara II owner's manual** for the operating modes of as a main system.

Rigging system description

K1-BUMP

The K1-BUMP is designed to fly K1 and/or K1-SB enclosure arrays. The K1-BUMP features one rack stabilizer to mount up to four LA-RAK II AVB touring racks on the structure.

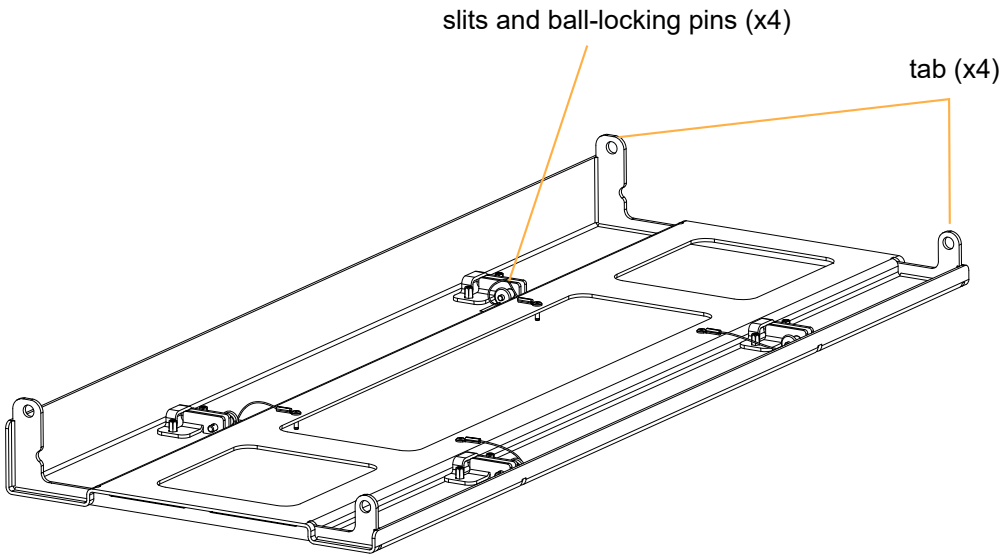


KARA-DOWNK1

KARA-DOWNK1 is a rigging interface for Kara II under a K1 array.

The four tabs on the top are compatible with the K1 rigging system.

The four slits fitted with ball-locking pins accommodate the Kara II rigging arms.



Mechanical safety

The K1 rigging system complies with 2006/42/EC: Machinery Directive. It has been designed following the guidelines of BGV-C1.

2006/42/EC: Machinery Directive specifies a safety factor of 4 against the rupture. The flown deployments described in this manual achieve a safety factor of **4 or more**.

Refer to Soundvision for the safety factor of a specific deployment.

The **safe limit** gives the maximum number of elements for which the safety factor is compliant with the 2006/42/EC: Machinery Directive, within the use defined in this manual and regardless of the other deployment parameters (site angles, inter-element angles, etc.).

The **maximum limit** gives the maximum number of elements for which the safety factor can be compliant with the 2006/42/EC: Machinery Directive, when the other deployment parameters provide the best mechanical conditions.

For mixed arrays refer to your Soundvision model.

Always refer to Soundvision for the safety factor of a mixed array.

When flying a K1 array with a Kara II downfill, the mechanical safety of all system elements must be considered. The indicated maximum limit applies to the K1 only.

Do not implement a pullback on a K1 array with a Kara II downfill.

K1

configuration	rigging accessory	safe limit	maximum limit
flown with a downfill	KARA-DOWNK1	6 Kara II	

Assessing mechanical safety

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.

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 beyond 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 the user's responsibility to secure the array and to ignore the warning.

Additional safety for flown arrays

When flying an array, use available holes to implement a secondary safety.

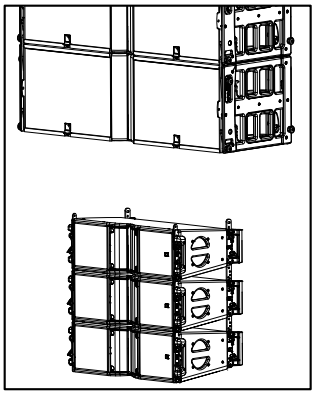
Considerations must be given to unusual conditions

Soundvision calculations are based on 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.

Rigging procedures

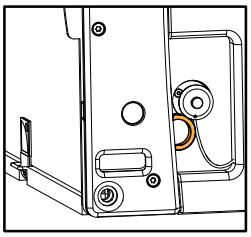
Rigging a Kara II downfill array under a K1 array

Prerequisite



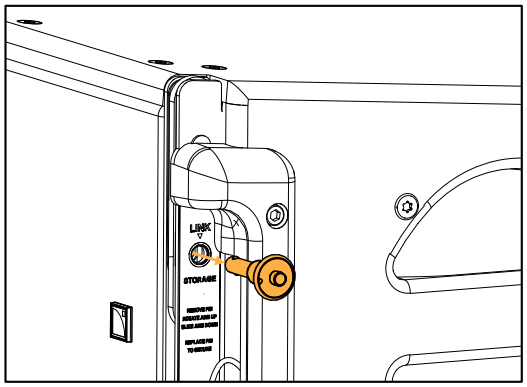
- Prepare and raise a K1 array. Refer to the **K1 rigging manual**.
- Prepare an array of three Kara II with 0° inter-enclosure angles. Refer to the **Kara II owner's manual**.
- Position the Kara II array under the K1 array.

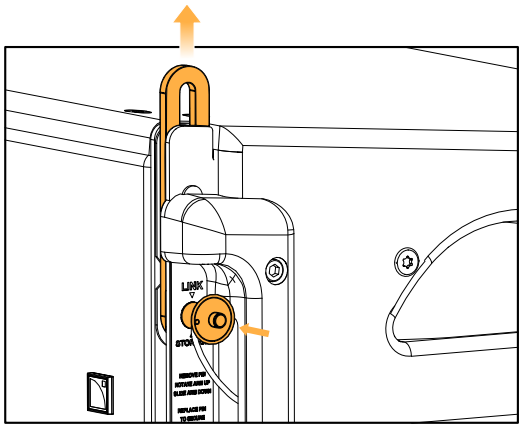
Make sure the latches on the bottom K1 are in storage position.



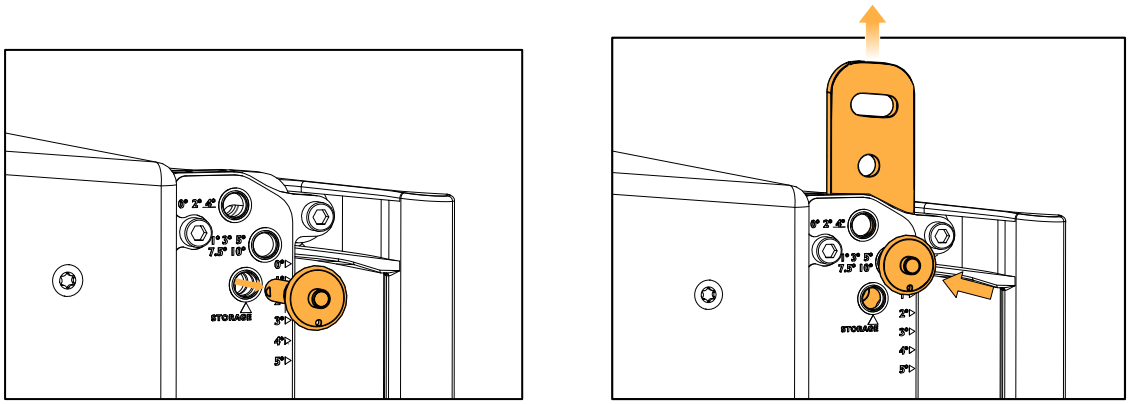
Procedure

1. Take out the four rigging arms on the top Kara II enclosure:
   a) Lock the front rigging arms in linking position.



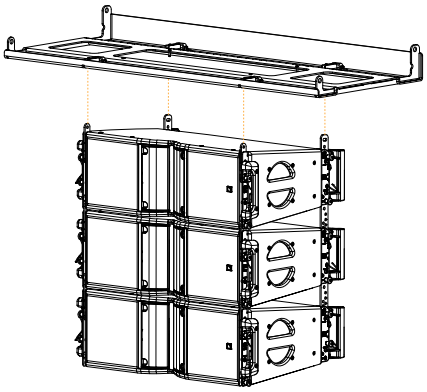


b) Slide up the rear rigging arms and select the same inter-element angle, from 0° to 10°.

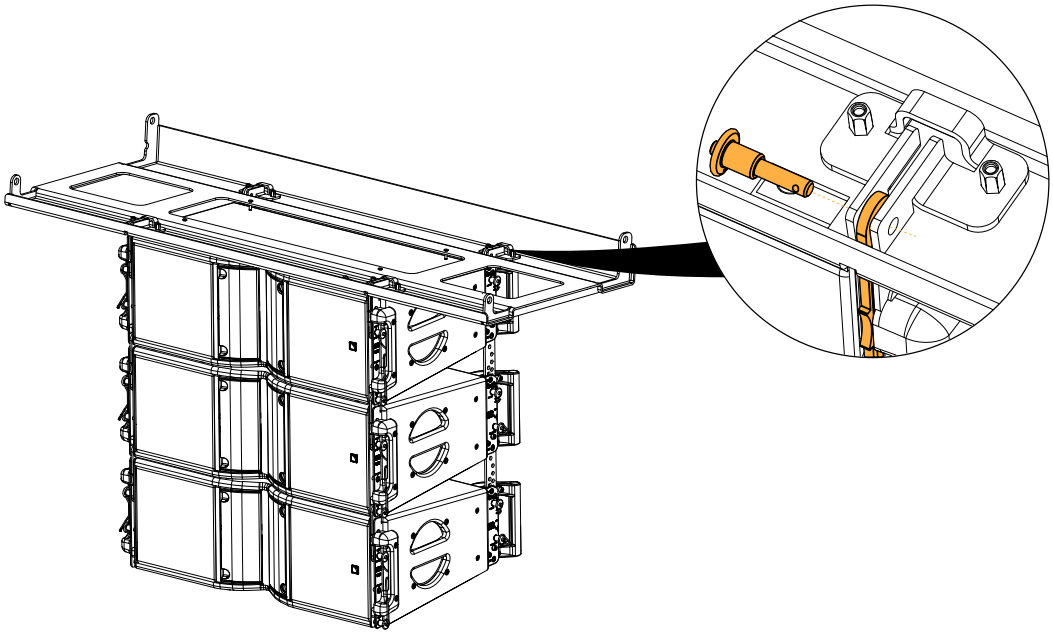


2. Secure a KARA-DOWNK1 on top of the Kara II array.

Position the higher ledge at the rear.

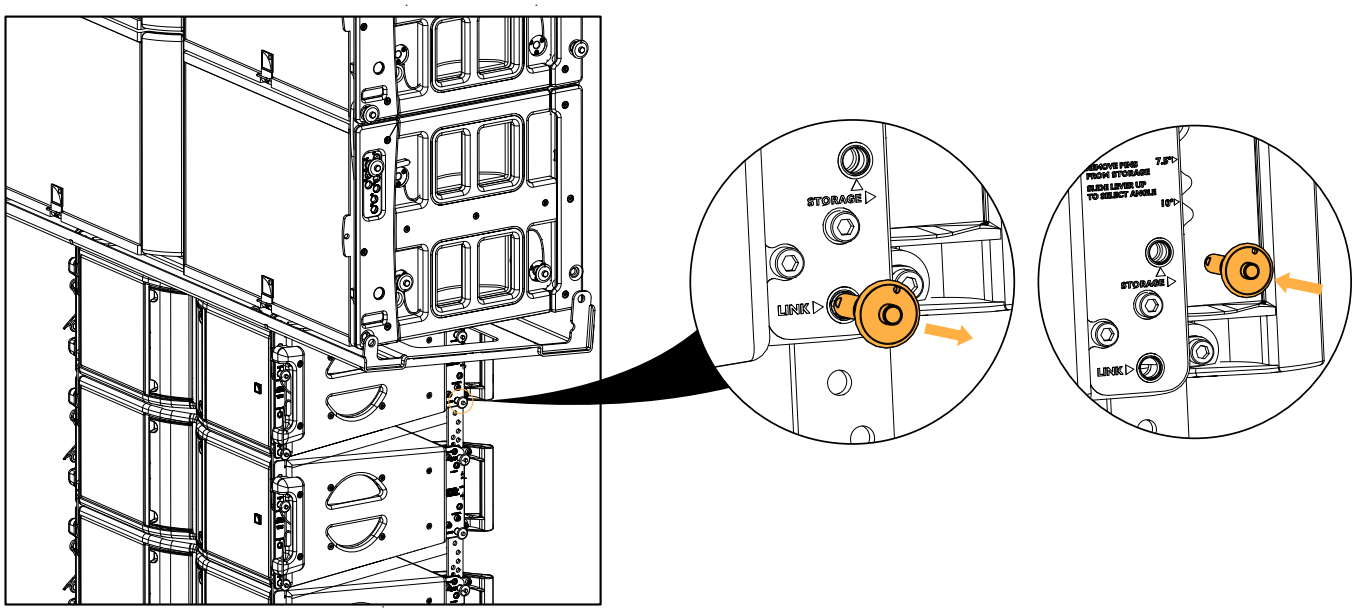


Secure the Kara II rigging arms inside the slits with the ball-locking pins.



3. Lower the K1 array as close as possible to the assembly without resting on it.

4. Disconnect the rear rigging between the two top Kara II enclosures.

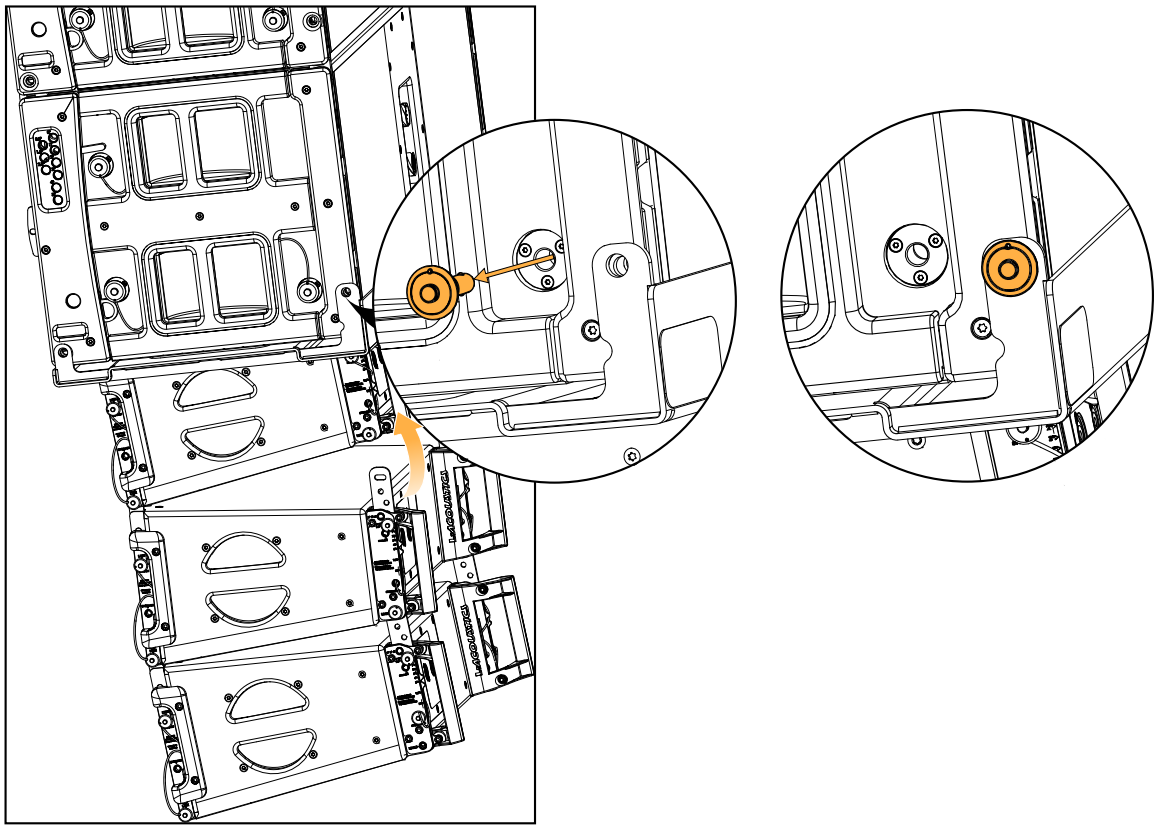


Risk of crushing injury.
Keep fingers away from the contact area between the ledge and the cabinet.

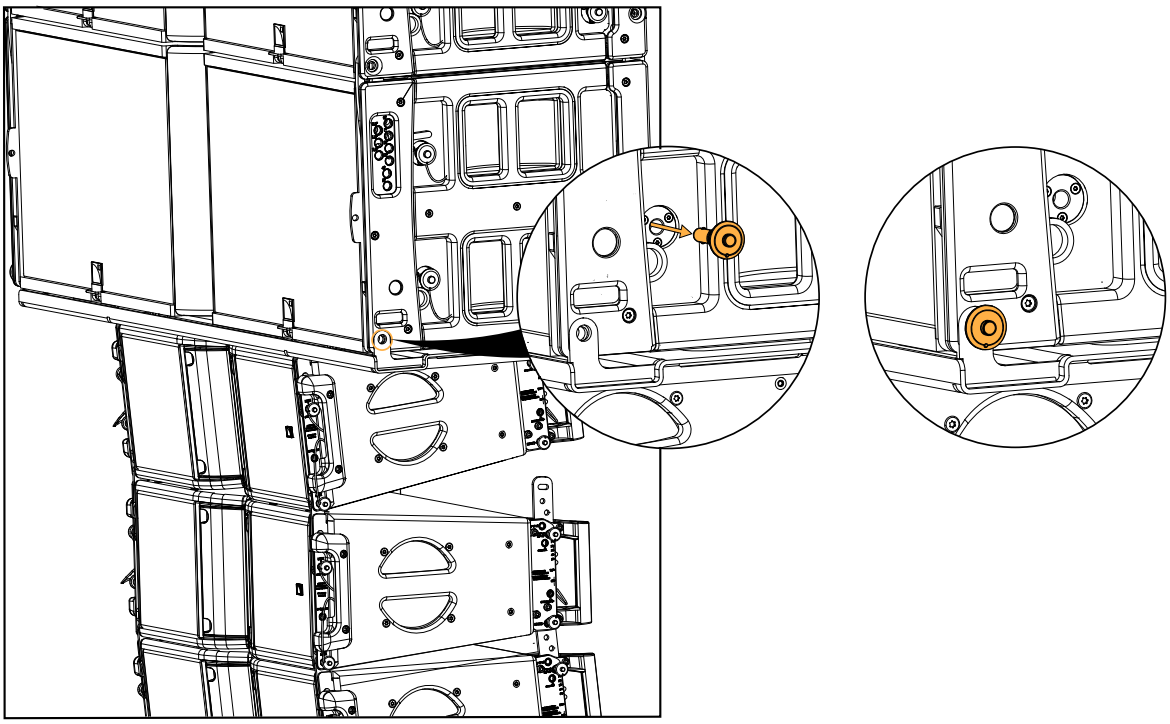
Risk of cable damage.
Disconnect any cable from the K1 bottom connector.

5. Connect KARA-DOWNK1 to the bottom of the K1 array:

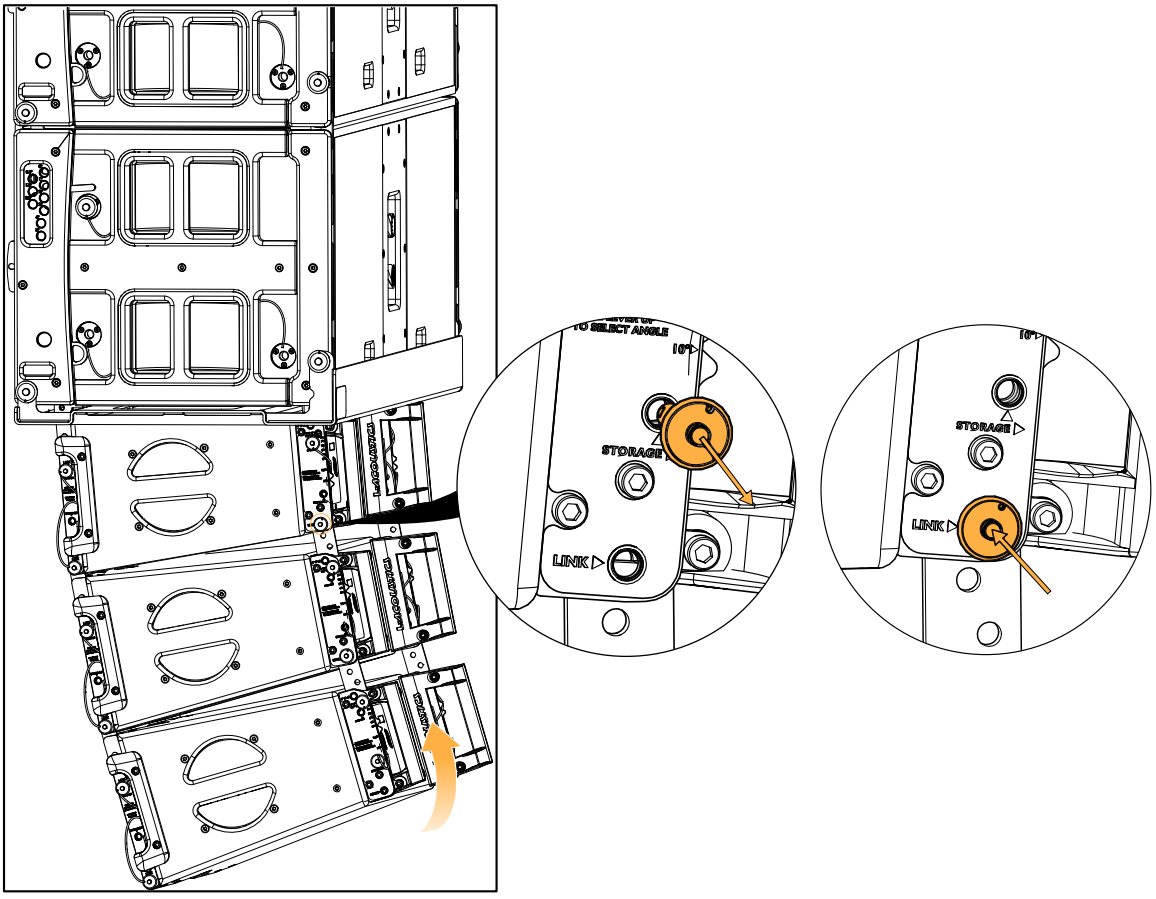
a) Rotate the top Kara II upwards and secure the rear KARA-DOWNK1 tabs to the K1 rigging.



b) Secure the front KARA-DOWNK1 tabs to the K1 rigging.
Slightly lower the K1 array if necessary.



c) Reconnect the top Kara II at the rear to the assembly.



6. Raise the array.

7. Set the inter-enclosure angles.

Refer to the **Kara II owner's manual**.

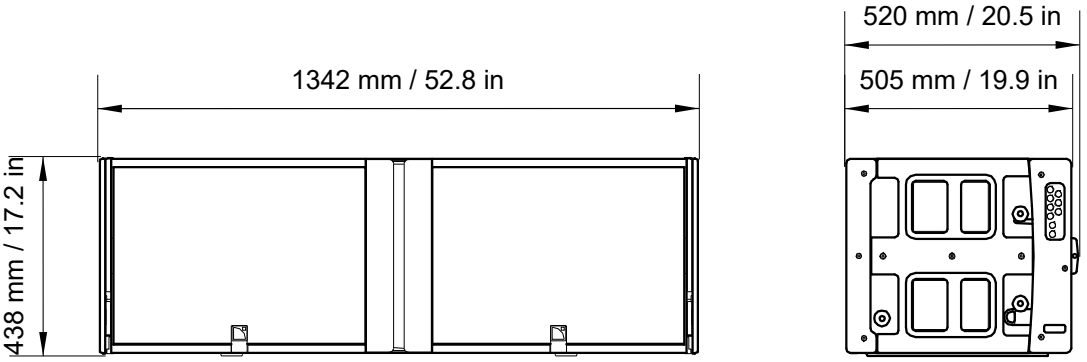
Specifications

K1 specifications

Description	3-way full-range active WST® enclosure , quad-amplified by LA12X
Usable bandwidth (-10 dB)	35 Hz - 20 kHz ([K1])
Maximum SPL[1]	149 dB ([K1])
Nominal directivity (-6 dB)	horizontal: 90° symmetric
	vertical: dependent upon the number of elements and the line source curvature
Transducers	LF: 2 × 15" neodymium
	MF: 4 × 6.5" neodymium, direct-radiating
	HF: 3× 3" diaphragm compression drivers
Acoustical load	LF: bass-reflex
	MF: bass-reflex
	HF: DOSC waveguide
Nominal impedance	LF: 2 × 8 Ω
	MF: 8 Ω
	HF: 8 Ω
Connectors	IN: 1 × 8-point PA-COM
	LINK: 1 × 8-point PA-COM
Rigging and handling	4 handles integrated into the cabinet
	inter-enclosure angles: 0°, 0.5°, 1°, 1.5°, 2°, 2.5°, 3°, 4° or 5°
Weight (net)	106 kg / 234 lb
Cabinet	premium grade Baltic birch plywood
	high density polyethylene
Front	coated steel grill
	acoustically neutral 3D fabric
Rigging components	high grade steel with anti-corrosion coating
Finish	grey brown RAL 8019
IP	IP43

[1] Peak level measured at 1 m under free field conditions using pink noise with crest factor 4 (preset specified in brackets).

K1 dimensions

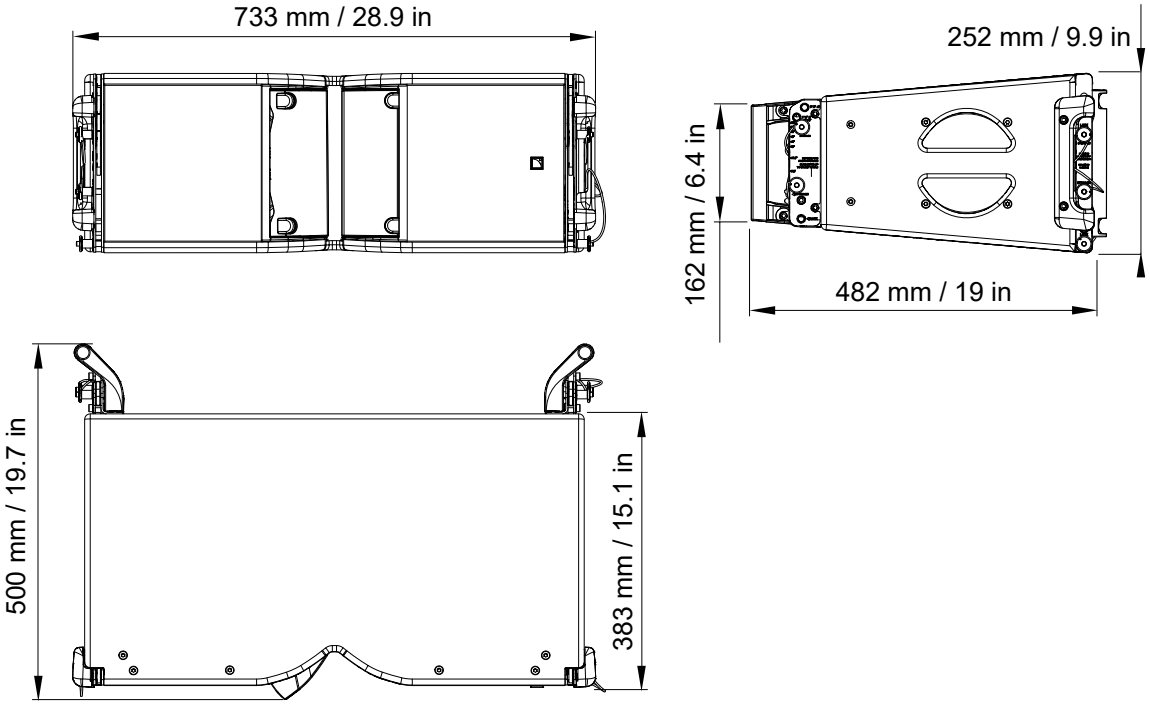


Kara II specifications

Description	2-way active WST® enclosure: 2 x 8" LF + 3" HF diaphragm, amplified by LA4X / LA8 / LA12X
Usable bandwidth (-10 dB)	55 Hz - 20 kHz ([KARA II 70])
Maximum SPL [1]	142 dB ([KARA II 70])
Nominal directivity (-6 dB)	horizontal: 70° / 110° symmetric or 90° asymmetric (35°/90°)
	vertical: dependent upon the number of elements and the line source curvature
Transducers	LF: 2 × 8" neodymium cone drivers
	HF: 1 × 3" neodymium diaphragm compression driver
Acoustical load	LF: bass-reflex
	HF: DOSC waveguide, L-Fins
Nominal impedance	LF: 8 Ω
	HF: 8 Ω
Connectors	IN: 1 × 4-point speakON
	LINK: 1 × 4-point speakON
Rigging and handling	4-point captive rigging system
	2 side handles
	2 rear handles
	inter-enclosure angles: 0°, 1°, 2°, 3°, 4°, 5°, 7.5° or 10°
Weight (net)	26 kg / 57 lb
Cabinet	premium grade Baltic birch plywood
Front	coated steel grill
	acoustically neutral 3D fabric
Rigging components	high grade steel with anti-corrosion coating
Finish	dark grey brown Pantone 426 C
IP	IP55

[1] Peak level measured at 1 m under free field conditions using pink noise with crest factor 4 (preset specified in brackets).

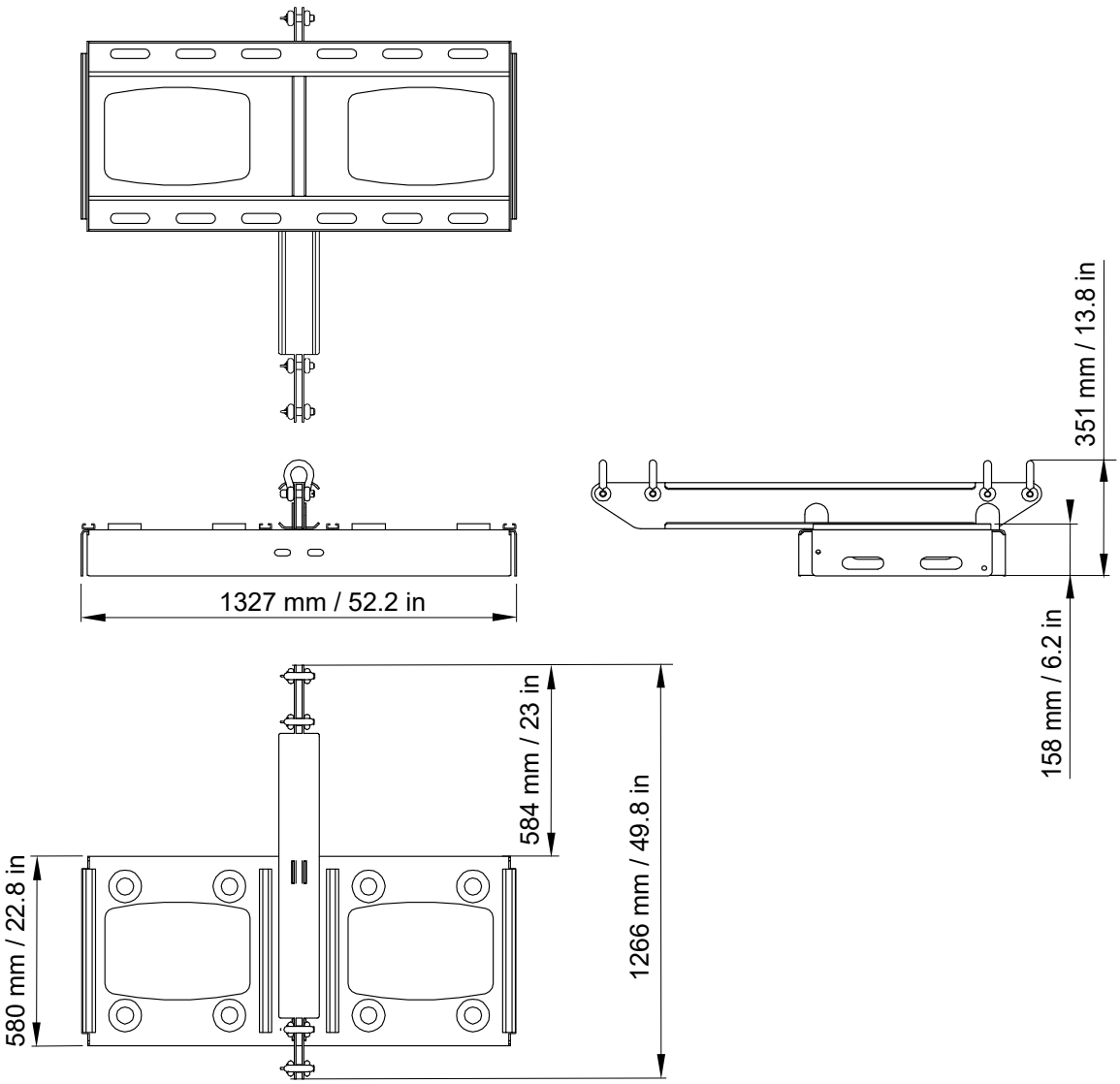
Kara II dimensions



K1-BUMP

Description	Rigging element for the K1 system
Weight (net)	98 kg / 216 lb
Material	high grade steel with anti-corrosion coating

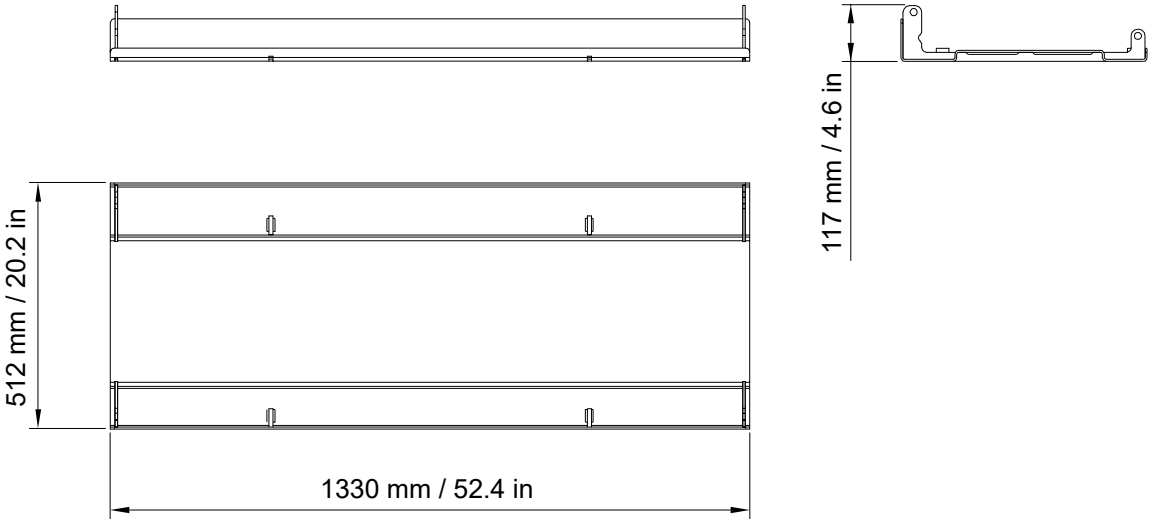
K1-BUMP dimensions



KARA-DOWNK1 specifications

Description	Flying bumper for rigging KARA under K1 or K1SB
Weight (net)	21 kg / 46 lb
Material	high grade steel with anti-corrosion coating

KARA-DOWNK1 dimensions



Recommendation for speaker cables

Follow the recommended maximum length for loudspeaker cables to ensure minimal SPL attenuation.

Cable quality and resistance

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

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

The table below provides the recommended maximum length for loudspeaker cables depending on the cable gauge and on the impedance load connected to the amplifier.

cable gauge			**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

Use the more detailed L-Acoustics calculation tool to evaluate cable length and gauge based on the type and number of enclosures connected. The calculation tool is available on our website:

https://www.l-acoustics.com/en/installation/tools/

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