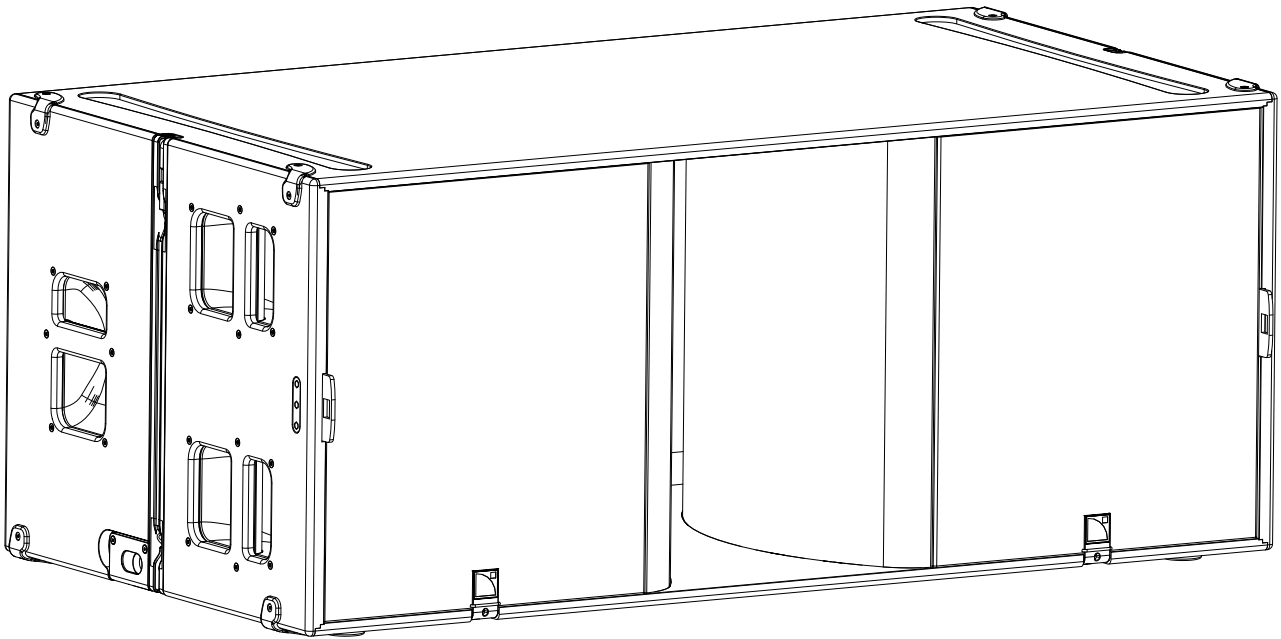


# KS28



user manual (EN)



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# Safety

## Instructions




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- 
**Inspect the product before operation.**  
 If any sign of defect or damage is detected, immediately withdraw the product from use for maintenance.
- 
**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.**
- 
**Beware of sound levels.**  
 Do not stay within close proximity of loudspeakers in operation.  
 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 at moderate level with prolonged exposure to sound.  
 Check the applicable laws and regulations relating to maximum sound levels and exposure times.
- 
**Read the RIGGING MANUAL before installing the system.**  
 Use the rigging accessories described in the rigging manual and follow the associated procedures.
- 
**Read the maintenance section of this document before servicing the product.**
- 
**Do not expose the product to extreme conditions.**  
 Do not expose the product to rain or sea spray.  
 Do not expose the product to moisture (mist, steam, humidity, condensation...) or excessive heat (direct sun, radiator...) for a long period of time.
- 
**Contact L-Acoustics for advanced maintenance.**  
 Any unauthorized maintenance operation will void the product warranty.

## Symbols

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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.

# Welcome

Thank you for purchasing the L-Acoustics KS28.

This document contains essential information on using the system properly.

**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 [www.l-acoustics.com](http://www.l-acoustics.com) on a regular basis to download the latest document and software updates.

## KS28 reference subwoofer

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The KS28 is a reference subwoofer designed to extend the frequency response of large format systems. The KS28 features two high excursion, 18" direct radiating transducers mounted in a bass-reflex tuned enclosure. The optimized L-Vents laminar vented port reduce turbulence and port noise at high levels while also increasing LF efficiency.

The KS28 operates from 25 Hz. The excursion capability of the transducer, combined with L-Vents contributes to deliver a high SPL, with low distortion. The KS28 can offer standard or cardioid directivity, by combining physical deployment and the suitable preset.

The KS28 is the first L-Acoustics enclosure to fully utilize the LA12X amplified controller power. The LA12X ensures advanced crossover functions, linearization and L-Drive protection of the transducers. Its onboard library offers standard and cardioid presets, each available with two low-pass filters to accommodate various coupling conditions and LF contour requirements.

The KS28 cabinet is assembled with birch and beech plywood panels. The use of panels optimized for thickness and combined with stiffeners gives the KS28 maximized internal volume, mechanical integrity and a low weight of 79 kg. It features six ergonomic handles for a solid grip and efficient handling. Bottom and side runners ensure safe stacking. A two-point suspension system is flush-mounted into the cabinet.

The KS28 is the ideal companion to large format systems in stacked or flown deployments. KS28 can significantly boost the LF extension and contour of line sources.

The KS28 can be stacked horizontally or vertically in standard or cardioid arrangements. With KS28-BUMP, KS28 can be flown in vertical arrays of standard or cardioid arrangements, up to 16 units.

## System components

### Loudspeaker enclosures

KS28 Flyable subwoofer 2 x 18"

### Powering and driving system

LA12X amplified controller with DSP, preset library and networking capabilities

LA-RAK II touring rack containing three LA12X, LA-POWER II for power distribution and LA-PANEL II for audio and network distribution

L-CASE 2U Electronics transport and protection case



Refer to the LA12X user manual for operating instructions.

### Loudspeaker cables

SP cables 4-point speakON loudspeaker cables (4 mm<sup>2</sup> gauge)  
 SP cables come in four sizes: SP.7 (0.7 m/2.3 ft), SP5 (5 m/16.4 ft), SP10 (10 m/32.8 ft) and SP25 (25 m/82 ft)

SP-Y1 breakout cable for two passive enclosures (2.5 mm<sup>2</sup> gauge) provided with a CC4FP adapter  
 4-point speakON to 2 x 2-point speakON

DO cables 8-point PA-COM loudspeaker cables (4 mm<sup>2</sup> gauge)  
 DO cables come in three sizes: DO.7 (0.7 m/2.3 ft), DO10 (10 m/32.8 ft) and DO25 (25 m/82 ft)

DOSUB-LA8 breakout cable for four passive enclosures (4 mm<sup>2</sup> gauge)  
 8-point PA-COM to 4 x 2-point speakON

DO3WFILL breakout cable for one 2-way active enclosure and two passive enclosures (4 mm<sup>2</sup> gauge)  
 8-point PA-COM to 1 x 4-point speakON and 2 x 2-point speakON



**Information about the connection of the enclosures to the LA amplifiers is given in this document.**

Refer to the LA12X user manual for detailed instructions about the whole cabling scheme, including modulation cables and network.

### Rigging elements



Rigging elements or procedures are not presented in this document.

Refer to the KS28 rigging manual.

### Software applications

Soundvision 3D acoustical and mechanical modeling software

LA Network Manager software for remote control and monitoring of amplified controllers



Refer to the **LA Network Manager video tutorial**.

Refer to the **Soundvision** help.

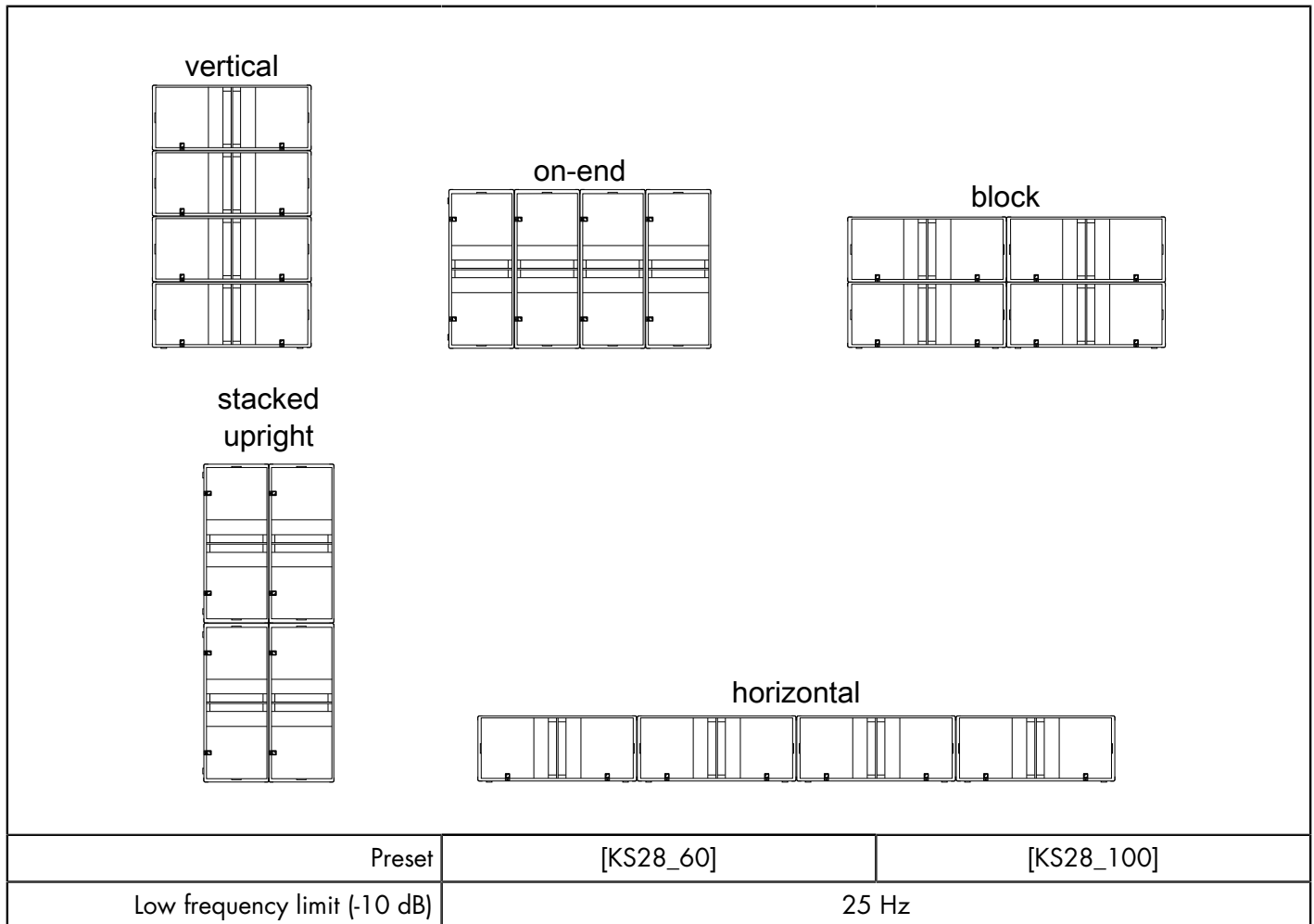
# Loudspeaker configurations

## KS28 in standard configuration

Deployed in a standard configuration, a KS28 system operates with an omnidirectional directivity pattern over the nominal bandwidth of the KS28 enclosure.

The [KS28\_60] and [KS28\_100] factory presets provide the subwoofer system with an upper frequency limit at 60 Hz and 100 Hz respectively in order to optimize the acoustic coupling with a main full-range system.

The KS28 subwoofers can only be driven by the LA12X amplified controller.



### ! Delay values

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.

### ! Grouping subwoofers

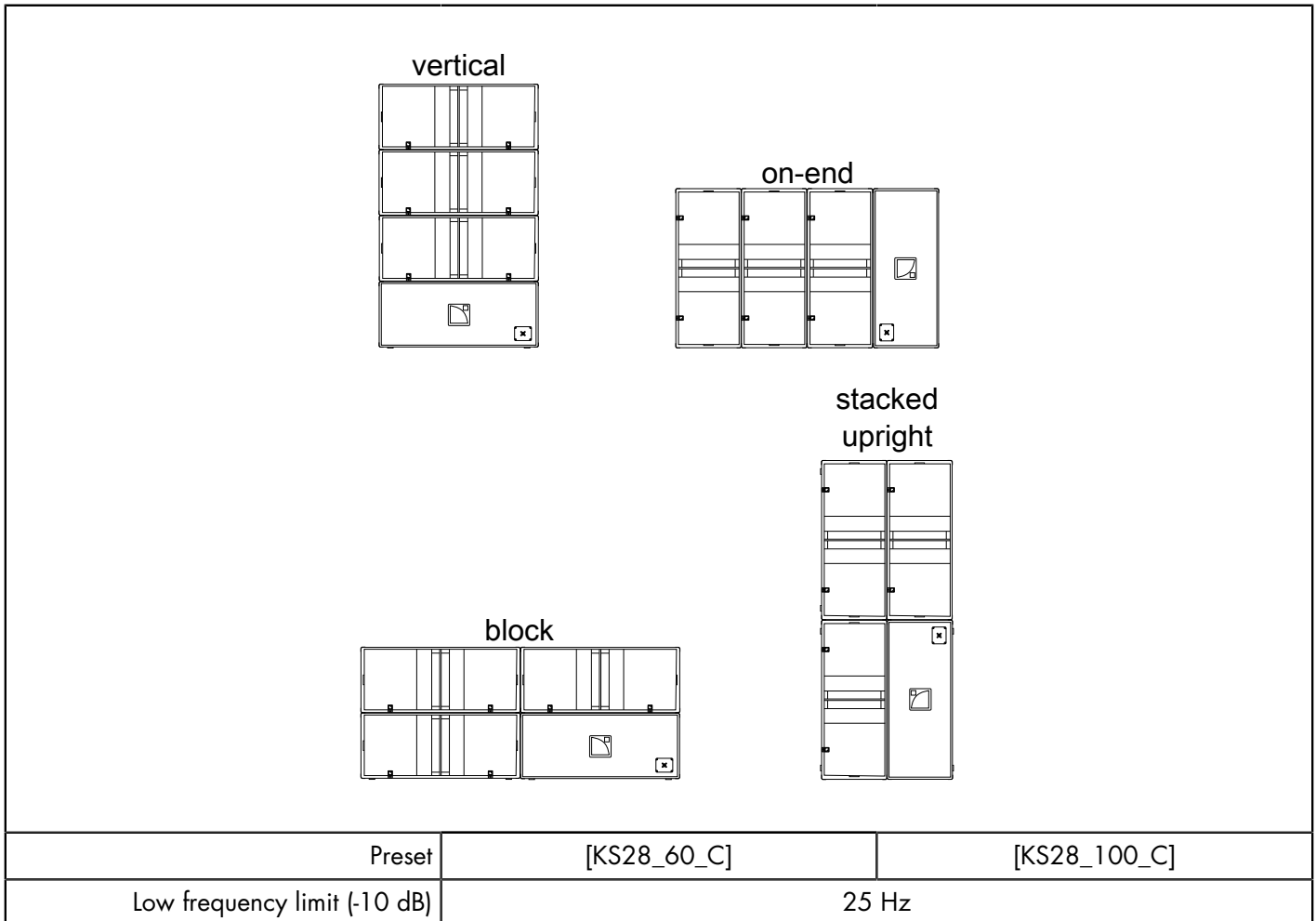
Place the subwoofer enclosures side by side. If not possible, the maximum distance between two adjacent acoustic centers must be 2.8 m or 1.7 m if the upper frequency limit of the subwoofer system is at 60 Hz or 100 Hz, respectively.

## KS28 in cardioid configuration

Deployed in a cardioid configuration, a KS28 system produces a rear SPL rejection. The deployment consists of an array of four KS28 with one reversed element, i.e. turned towards the rear. Refer to the **Cardioid Configurations** technical bulletin for more information.

The [KS28\_60\_C] and [KS28\_100\_C] factory presets provide the subwoofer system with an upper frequency limit at 60 Hz and 100 Hz respectively in order to optimize the acoustic coupling with a main full-range system.

The KS28 subwoofers can only be driven by the LA12X amplified controller.



### ! Delay values

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.

### ! Grouping subwoofers

Place the subwoofer enclosures side by side. If not possible, the maximum distance between two adjacent acoustic centers must be 2.8 m or 1.7 m if the upper frequency limit of the subwoofer system is at 60 Hz or 100 Hz, respectively.



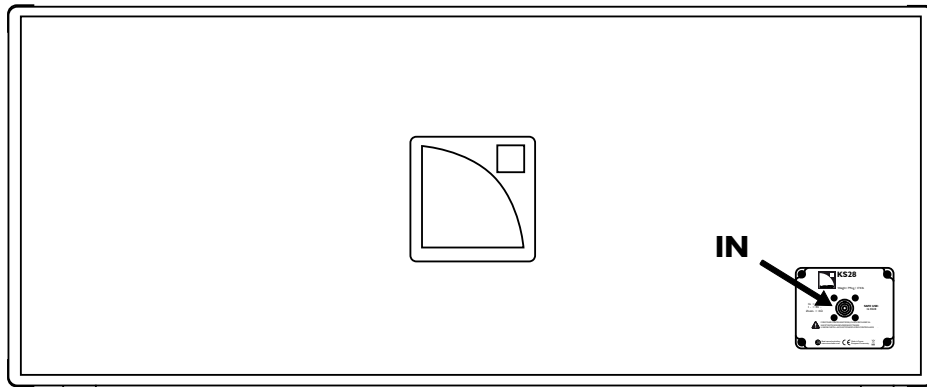
# Loudspeaker connection

## Connectors

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The KS28 is equipped with one 4-point speakON connector.

### KS28



### Internal pinout for L-Acoustics subwoofers

speakON points	1 +	1 -	2 +	2 -
Transducer connectors	LF +	LF -	Not linked	Not linked

## Connection to LA12X

### Maximum number of enclosures per LA12X

enclosure	max enclosures in parallel	max enclosures per controller
KS28	1	4

### Impedance load

KS28

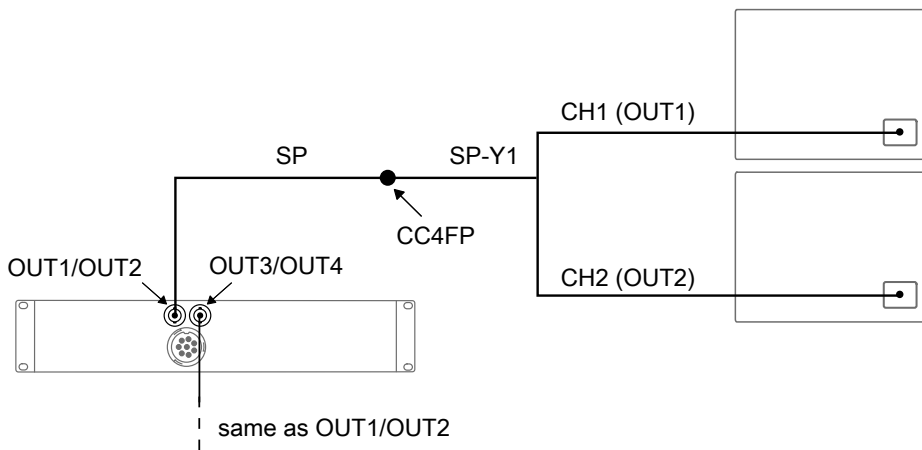
1 enclosure: 4 Ω

### Connecting subwoofers

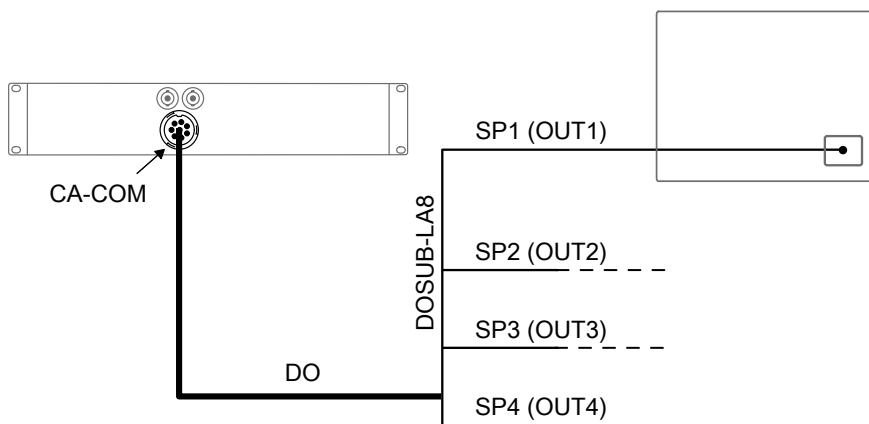
#### ! Cardioid configuration

Connect the reversed subwoofer(s) to OUT 1 to use the cardioid preset.

Subwoofer on speakON output - SP + SP-Y1

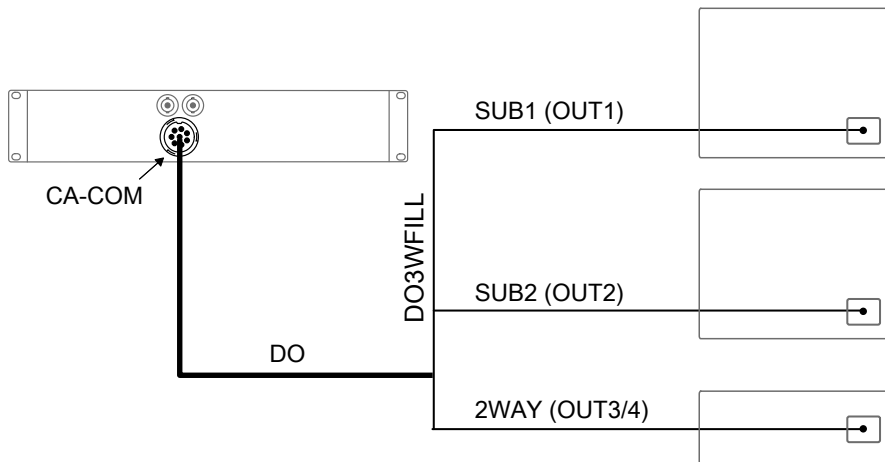


Subwoofer on CA-COM output - DO + DOSUB-LA8



## Connecting a 2-way active enclosure with subwoofers

2-way active enclosure and subwoofers on CA-COM output - DO + DO3WFILL



## Preset description

### [KS28\_60] [KS28\_100]

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

### [KS28\_60\_C] [KS28\_100\_C]

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

## 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 <sup>2</sup>	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

For your installation projects, you can 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:

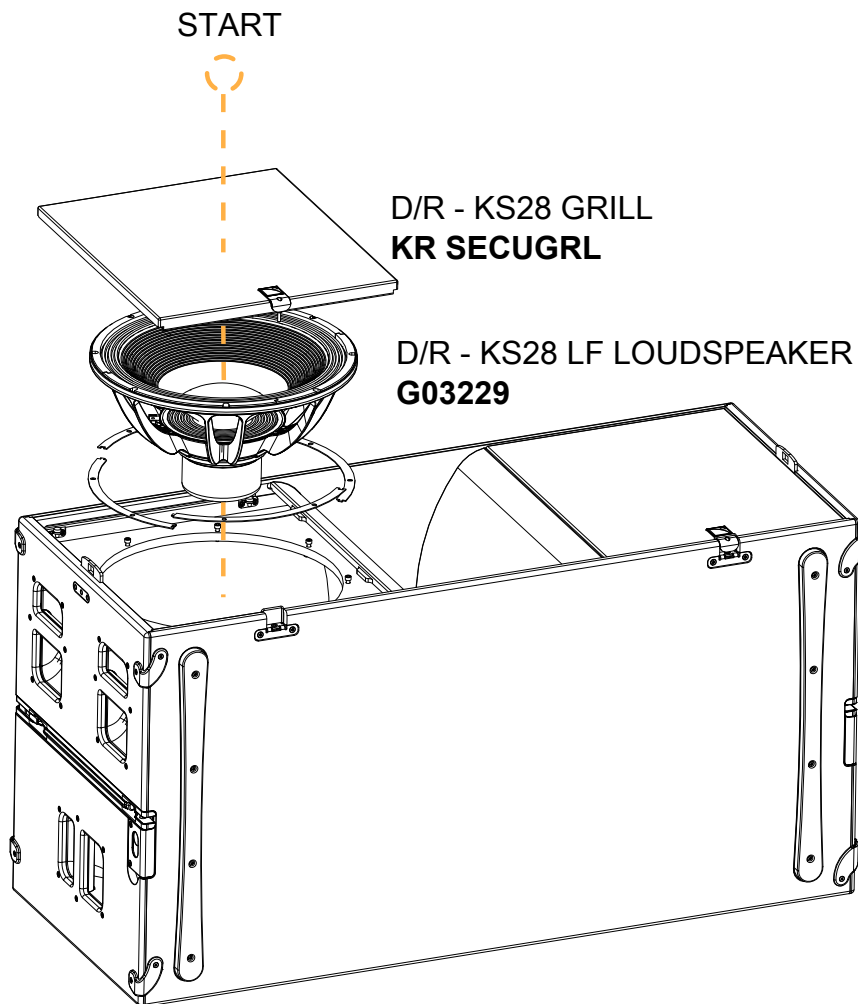
<http://www.l-acoustics.com/installation-outils-de-calcul-137.html>

# Maintenance

## Disassembly and Reassembly procedures

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In order to operate, follow the order outlined here.



## D/R - Grill

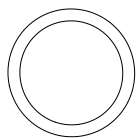
### Tools

- torque screwdriver
- 5 mm hex bit
- screwdriver extension
- 100226 provided in KR SECUGRL

### Repair kits

#### KR SECUGRL

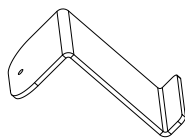
#### Kit safety O-rings for front grill



x100

100557

grill safety O-ring



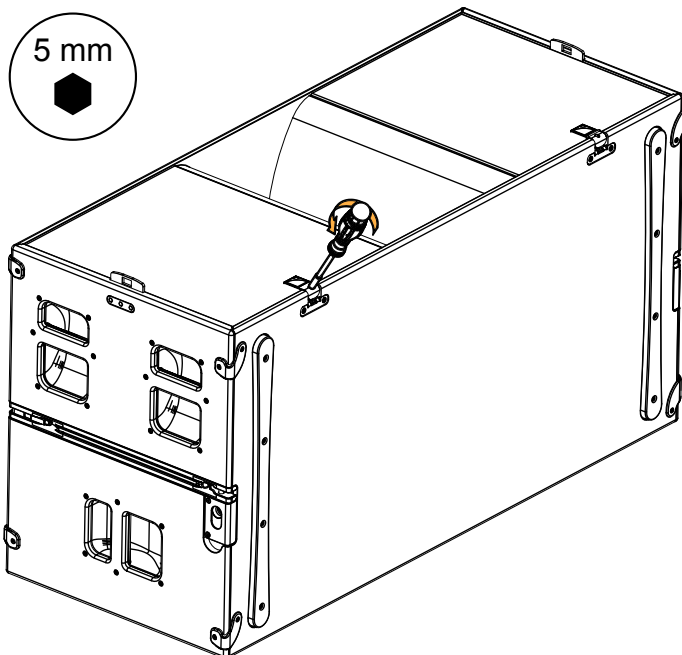
x1

100226

grill safety tool

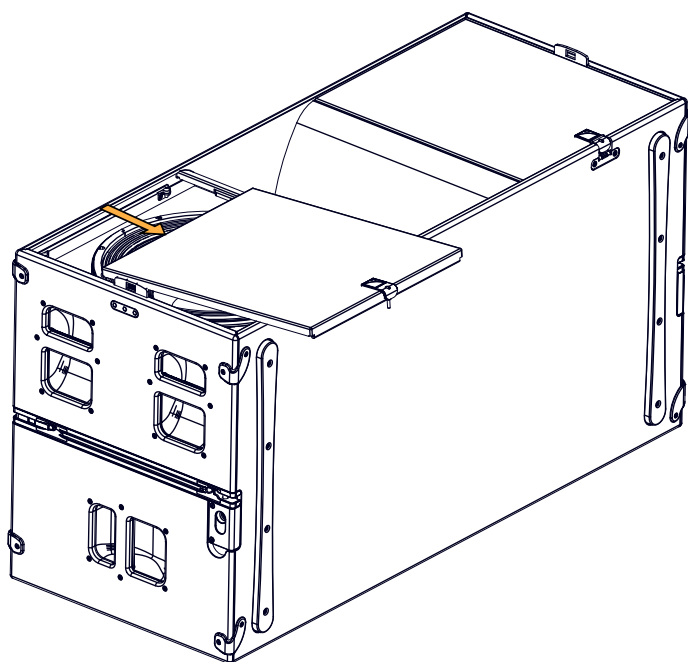
### Disassembly

1. Loosen the captive grill screw.



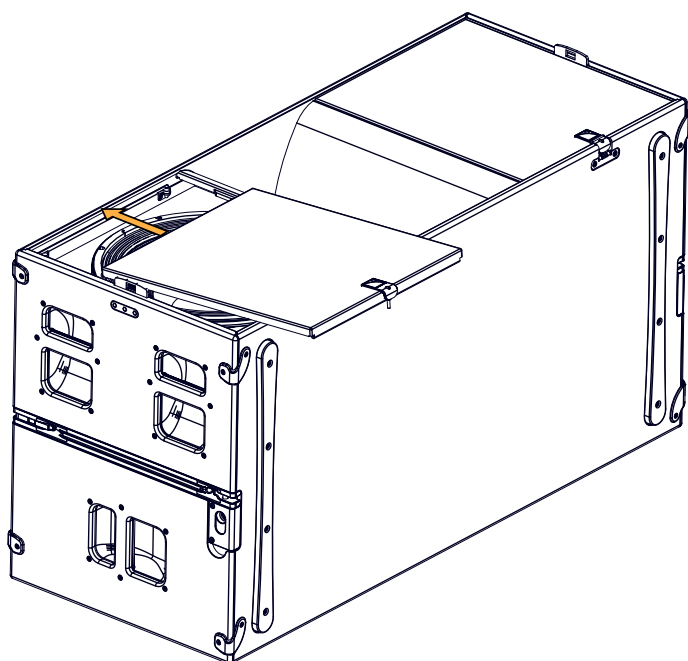
2. Slide the grill to remove it.

If necessary, pull down the safety O-ring.



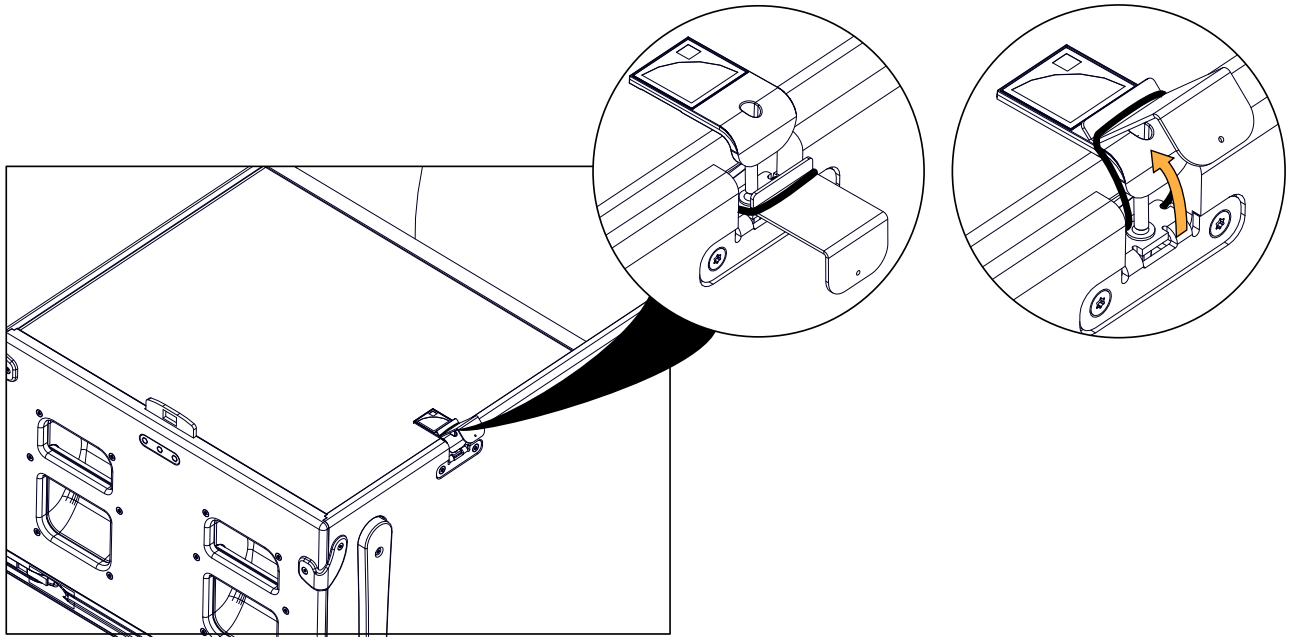
## Reassembly

1. Position the grill starting with the top.

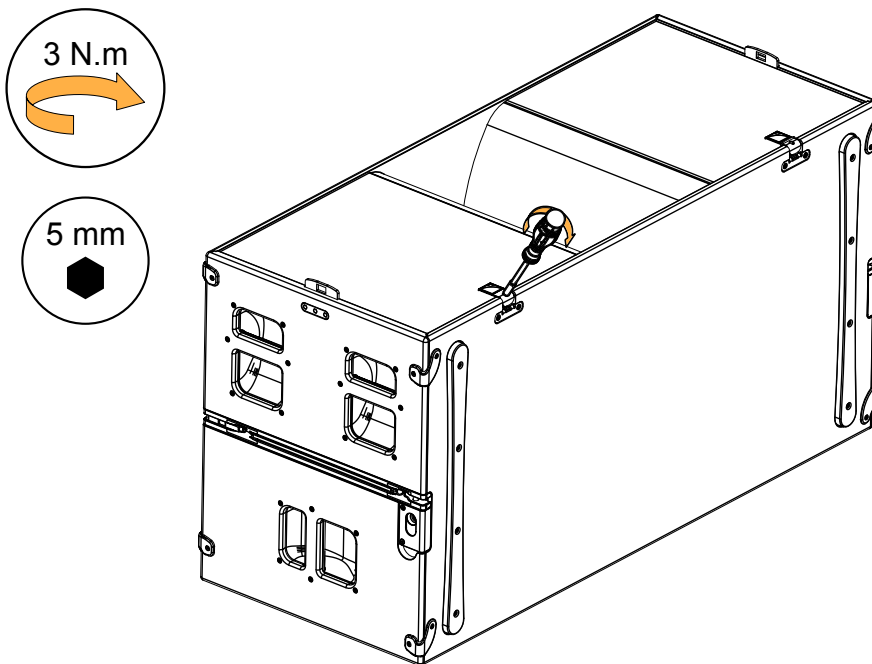




2. With the 100226, stretch the O-ring and pull it above the captive screw.



3. Secure the grill with the captive screw.



## D/R - LF loudspeaker

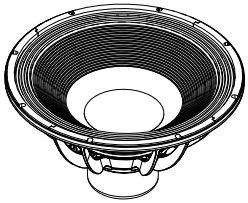
### Tools

- torque screwdriver
- 5 mm hex bit

### Repair kits

#### G03229

KR speaker KS28



x1

17545

18" speaker - 8 ohms



x8

S100054

M6x30 hex



x4

100689

18" speaker gasket

### Pre-requisite

Grill disassembled.

See [Grill](#) (p.15).



For safety reasons, always use the new screws and spare parts provided in the KR.

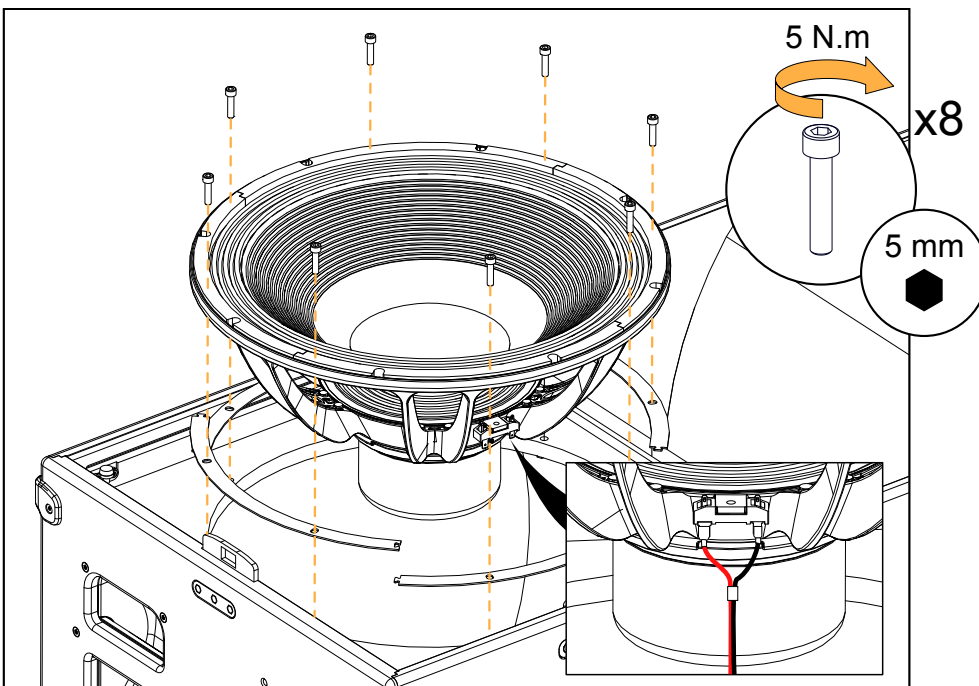
### Exploded view



Tighten the screws following a star pattern.



Check that the cable tie is intact.




## Acoustical check

### Enclosure check

 **This feature is available on:**  
LA12X

ENCLOSURE CHECK measures impedance at the reference frequencies for the connected loudspeaker family. The measured impedance is compared to the expected range allowing for fast detection of loudspeakers presenting circuit continuity issues.

 The results can be used for preliminary diagnosis but cannot replace a comprehensive quality control.

### Pre-requisite

 **ENCLOSURE CHECK measurements can only be reliable if the following requirements are met:**

Environment and temperature:

- Ambient temperature must be comprised between 0 °C / 32 °F and 40 °C / 104 °F. Ideal temperature is 20 °C / 68 °F.
- Enclosures must be at room temperature. If warm from a recent high level use or recently moved from a cold environment, let the loudspeakers reach room temperature before starting.

Enclosures:

- Enclosures must be included in the embedded factory preset library.
- Enclosures must be in nominal operating conditions:
  - Remove covers or dollies obstructing the loudspeakers or the vents.
  - Check for obvious physical damage or air leak: visually inspect the grill, gasket, cabinet, and connector plate for loose, missing or damaged parts.

Connection:

- Use only 10 m / 30 ft 4 mm<sup>2</sup> / AWG 11 speaker cables.
- Do not connect enclosures in parallel.

Amplified controllers:

- Load a preset corresponding to the connected loudspeaker's family. Presets from the user memories may be used on condition they are made of presets supported in the embedded factory preset library.

### Procedure

1. Power up the amplified controller.
2. Connect the loudspeaker enclosures to the amplified controller.
3. Load a preset from or built from the embedded library corresponding to the connected loudspeaker family.
4. On the amplified controller, use the encoder wheel to select **MONITORING & INFO**. Press the OK key or the encoder wheel to validate.
5. Use the encoder wheel to select **ENCLOSURE CHECK**.



#### **Beware of sound levels.**

Although the sound pressure levels generated for the ENCLOSURE CHECK are moderate, do not stay within close proximity of the loudspeakers and consider wearing ear protection.

6. Press the OK key or the encoder wheel to launch the ENCLOSURE CHECK.

The amplified controller generates short sinusoidal signals simultaneously for each connected output.

The amplified controller displays the results for each output.

7. Depending on the displayed results, follow the instructions in the table.

result	interpretation	instructions
OK	measured impedance is within expected range	enclosure is in working order electrically

result	interpretation	instructions
?	unsupported preset family	only supported enclosures should be tested
NC	Not Connected	if cables are connected: <b>1.</b> inspect the cables and connections <b>2.</b> go to step 8 (p.20)
NOK	measured impedance is not within expected range	<b>1.</b> check that all the prerequisites are met, in particular that the loaded preset corresponds to the connected speaker's family <b>2.</b> inspect the cables and connections <b>3.</b> go to step 8 (p.20)
UNDEF	measured impedance is undefined	

- 8.** Under NC, NOK and UNDEF results, press and hold the corresponding OUT key.

The amplified controller displays:

- the tested frequencies,
- information on the measured impedance:
  - OPEN for open circuit (found in NC results),
  - SHORT for short circuit (found in NOK results), or
  - a percentage of variation from the expected range (found in NOK and UNDEF results)
- the number of operational transducers out of the total



Low variations from the expected range are acceptable: displayed percentage can be different from 0 and all transducers considered operational.

## Listening test

### Procedure

1. Load the [KS28\_100] preset on an LA12X amplified controller.
2. Connect a sinus generator to the amplified controller.



#### **Risk of hearing damage**

Set a low sound level to start and use ear protection to adjust before testing.

3. Scan the usable bandwidth (25 Hz - 110 Hz).  
The sound should remain pure and free of unwanted noise.

### Troubleshooting for LF speakers

One or more LF loudspeaker produces distorted, buzzing, rubbing or weak sound.

#### **Possible causes**

- The screws used for reassembly are too loose.
- There is an air leak in the gasket.
- There is dust on the cone.
- The cone is damaged.
- The voice coil and/or the spider is damaged.

#### **Procedure**

1. Perform the disassembly procedure.
2. Visually inspect the loudspeaker and the cables.  
If any damage is visible, replace the loudspeaker.
3. Carefully clean the loudspeaker with a dry cloth.
4. Repeat the reassembly procedure.  
Replace the loudspeaker gasket and the screws.  
Apply the recommended torque.
5. Repeat the listening test.
6. If a buzzing sound is still audible, repeat the test on the loudspeaker outside of the enclosure.  
If the problem persists, replace the loudspeaker.

# Illustrations

## Loudspeaker cables

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**SP.7**

4-point speakON loudspeaker cable (0.7 m / 2.3 ft)



**SP5**

4-point speakON loudspeaker cable (5 m / 16.4 ft)



**SP10**

4-point speakON loudspeaker cable (10 m / 32.8 ft)



**SP25**

4-point speakON loudspeaker cable (25 m / 82 ft)



**DO.7**

8-point PA-COM loudspeaker cable (0.7 m / 2.3 ft)



**DO10**

8-point PA-COM loudspeaker cable (10 m / 32.8 ft)



**DO25**

8-point PA-COM loudspeaker cable (25 m / 82 ft)



**DO3WFILL**

breakout cable for one 2-way active enclosure and two passive enclosures



**DOSUB-LA8**

breakout cable for four passive enclosures



**SP-Y1**

breakout cable for two passive enclosures

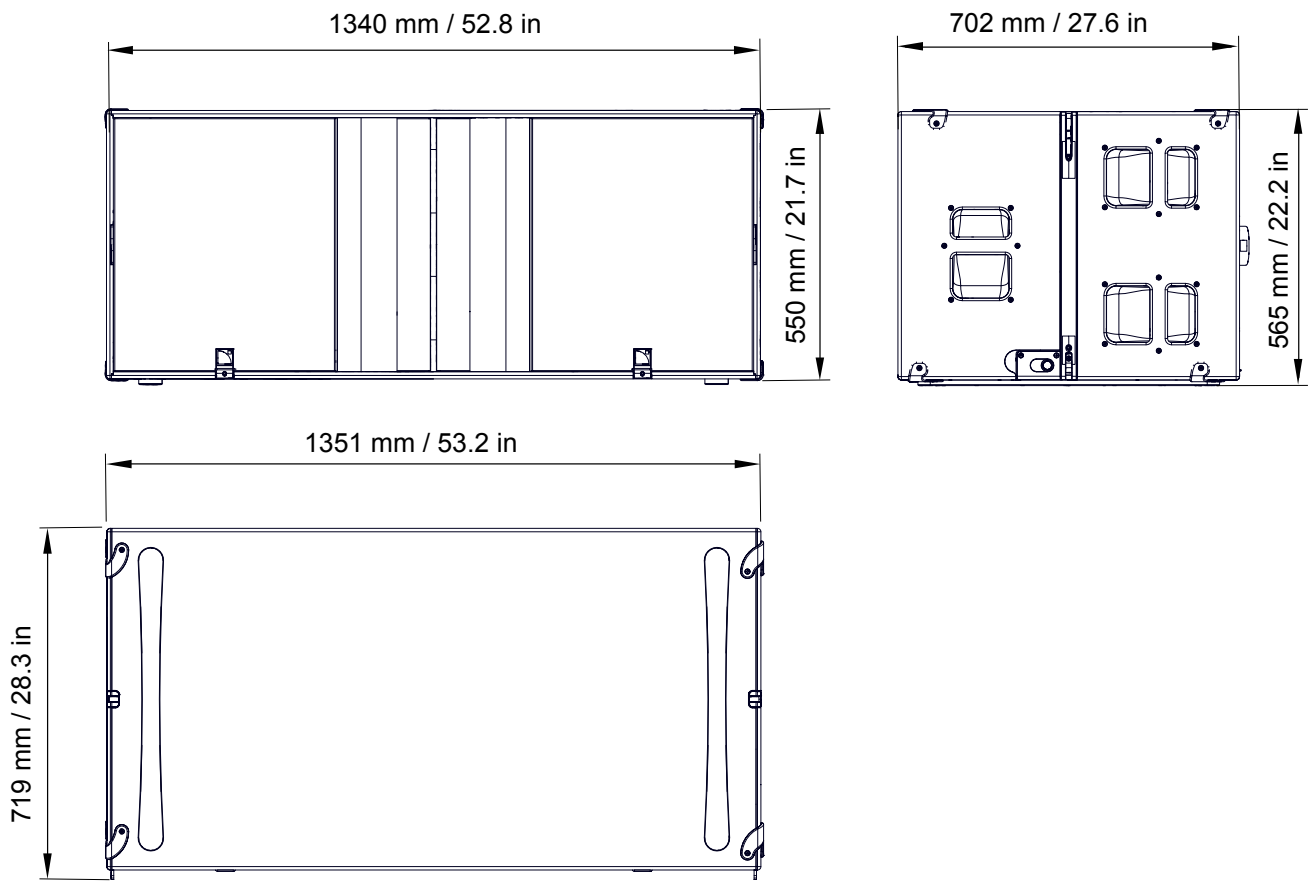
## KS28 specifications

<b>Description</b>	flyable subwoofer 2 x 18", amplified by LA12X
<b>Low frequency limit (-10 dB)</b>	25 Hz ([KS28_100])
<b>Maximum SPL<sup>1</sup></b>	143 dB ([KS28_100])
<b>Directivity</b>	standard or cardioid
<b>Transducers</b>	2 x 18" neodymium, aluminium die cast basket
<b>Acoustical load</b>	bass-reflex, L-Vents
<b>Nominal impedance</b>	4 $\Omega$
<b>Connectors</b>	4-point speakON
<b>Rigging and handling</b>	flush-fitting 2-point rigging system 6 ergonomic handles 2 ground runners 8 side runners
<b>Weight (net)</b>	79 kg / 174 lb
<b>Cabinet</b>	first grade Baltic beech and birch plywood
<b>Front</b>	steel grill with anti-corrosion coating acoustically neutral 3D fabric
<b>Rigging components</b>	high grade steel
<b>Finish</b>	dark grey brown Pantone 426C

<sup>1</sup> Peak level at 1 m under half space conditions using pink noise with crest factor 4 (preset specified in brackets).

## KS28 dimensions

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**L-Acoustics, an L-Group Company**

13 rue Levacher Cintrat - 91460 Marcoussis - France

+33 1 69 63 69 - info@l-acoustics.com

[www.l-acoustics.com](http://www.l-acoustics.com)

**L-Acoustics GmbH**

Steiermärker Str. 3-5  
70469 Stuttgart  
Germany  
+49 7 11 89660 323

**L-Acoustics Ltd.**

PO. Box Adler Shine - Aston House  
Cornwall Avenue - London N3 1LF  
United Kingdom  
+44 7224 11 234

**L-Acoustics Inc.**

2645 Townsgate Road, Suite 600  
Westlake Village, CA 91361  
USA  
+1 805 604 0577



L-GROUP

[www.l-group.com](http://www.l-group.com)