



## Introduction

An L-Acoustics loudspeaker configuration composed of several loudspeaker elements is defined by the association of a physical deployment and dedicated electronic processing (preset). It aims at creating a coherent sound source with distinct sonic properties. The choice of a loudspeaker configuration shall be based upon the sonic objectives which are most adapted to a given application.

This technical bulletin describes the three subwoofer configurations supported by L-Acoustics and their respective sonic properties.

## L-Acoustics subwoofer configurations

### Standard configuration

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A standard configuration will exhibit a quasi-omnidirectional pattern. It is obtained within a cluster with all subwoofers facing forward and using the associated standard preset (e.g.: [KS28\_60]). This configuration maximizes SPL in front and ensures best temporal integrity.

It should be used in applications where rear cancelation is not required, and front response is most important.

### Cardioid C configuration

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A Cardioid C configuration will exhibit a cardioid pattern. It is obtained by reversing one enclosure per group of three or four subwoofers\* and using the associated cardioid preset (e.g.: [KS28\_60\_C]). This configuration offers rear SPL cancelation centered around the most critical frequencies with little to no compromises on front SPL and temporal integrity.

It should be used in applications where rear cancelation and front response are equally important.

### Cardioid Cx configuration

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A Cardioid Cx configuration will exhibit a cardioid pattern. It is obtained by reversing one enclosure per group of three or four subwoofers\* and using the associated cardioid preset (e.g.: [KS28\_60\_Cx]). This configuration offers broadband rear SPL cancelation with limited compromise on front SPL and temporal integrity.

It should be used in applications where rear cancelation is most important.

## Design notes

All three configurations were developed in-house in a controlled environment offering engineers a plug-and-play solution that saves both time and effort during system optimization.

Great attention was taken to the following criteria:

<b>Front SPL</b>	Energy in front of the array within a 120° cone.
<b>Rear SPL cancelation</b>	Energy cancelation at the back of the array within a 120° cone.
<b>Temporal integrity</b>	Temporal response in front of the array.

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\* Reversing one enclosure per group of two subwoofers is also possible but reduces front SPL efficiency.

## Example

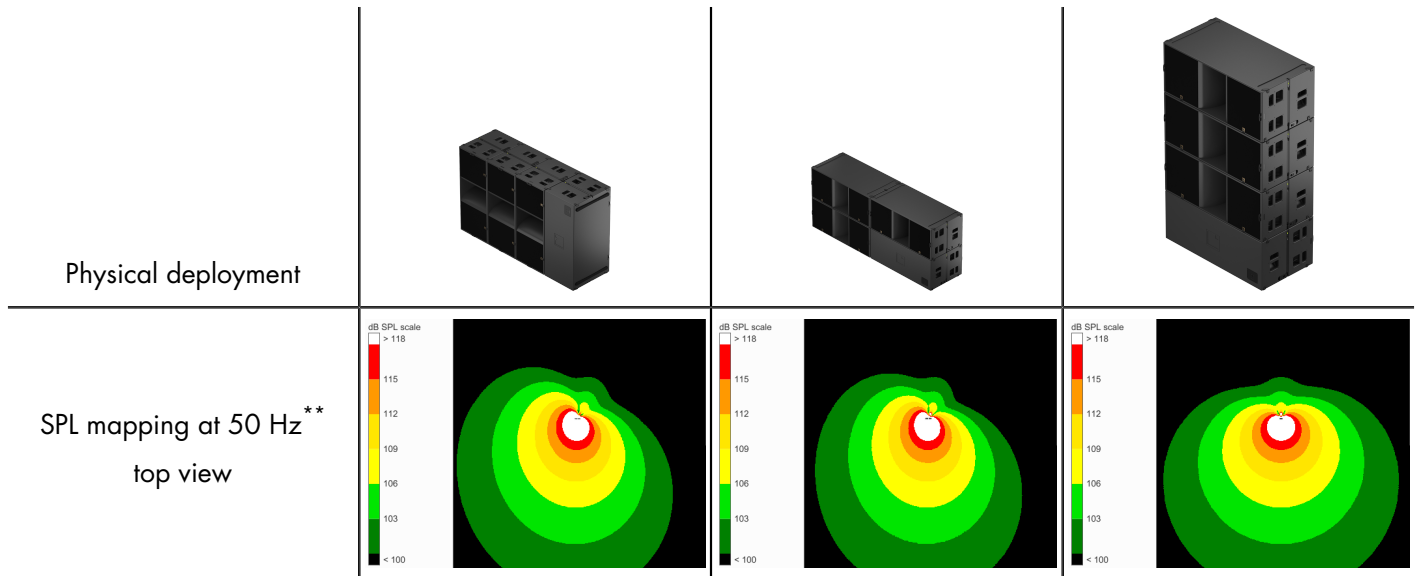
The following table highlights the results of the three configurations for a stack of three KS28 using the 60 Hz preset (with one subwoofer reversed for Cardioid C and Cardioid Cx configurations), ranking the configurations from fair (★ ☆ ☆) to excellent (★ ★ ★) performance according to criteria explained in [Design notes](#) (p.1).

Configuration	Standard	Cardioid C	Cardioid Cx
Front SPL	★ ★ ★	★ ★ ☆	★ ☆ ☆
Rear SPL cancelation	★ ☆ ☆	★ ★ ☆	★ ★ ★
Temporal integrity	★ ★ ★	★ ★ ☆	★ ☆ ☆
<b>Polar response</b> <b>1/3<sup>rd</sup> octave</b> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <ul style="list-style-type: none"> <li>— 1/3 Oct. 25Hz</li> <li>— 1/3 Oct. 31.5Hz</li> <li>— 1/3 Oct. 40Hz</li> <li>— 1/3 Oct. 50Hz</li> <li>— 1/3 Oct. 63Hz</li> <li>— 1/3 Oct. 80Hz</li> <li>— 1/3 Oct. 100Hz</li> </ul> </div>			
<b>Polar response</b> <b>[20-200 Hz]</b> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <ul style="list-style-type: none"> <li>— Std</li> <li>— C</li> <li>— Cx</li> </ul> </div>			

## Physical deployment for cardioid configuration

Facts:

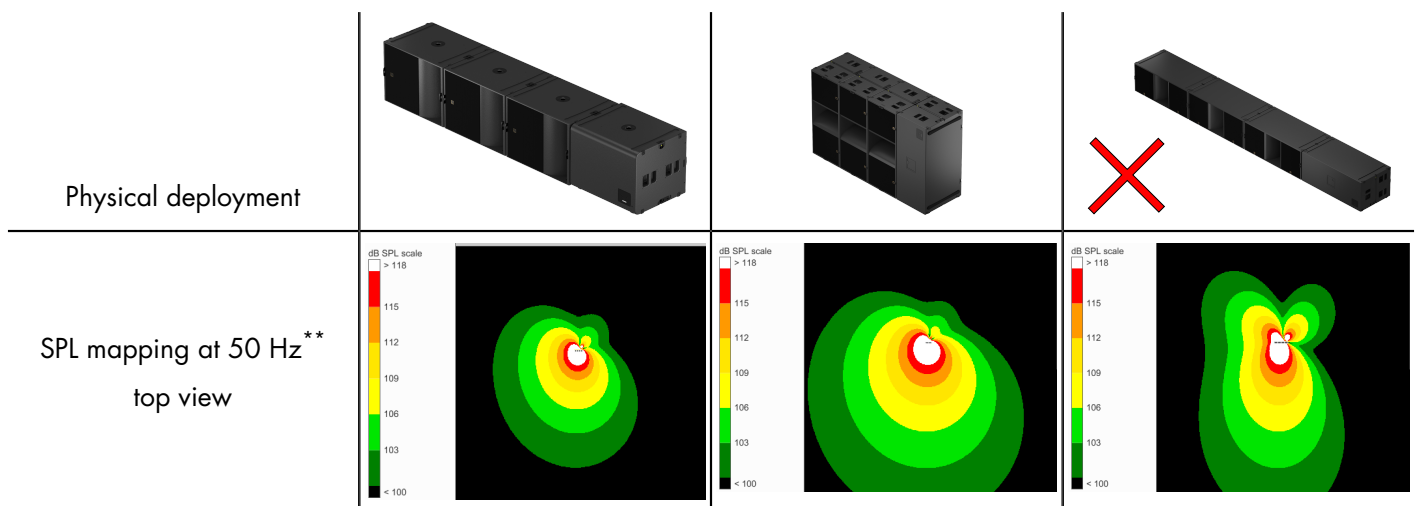
- The greater the size of the array, the more directional the system
- The orientation of the maximum cancellation depends on the position of the physically reversed subwoofer



## Distance between direct and reversed acoustic centers

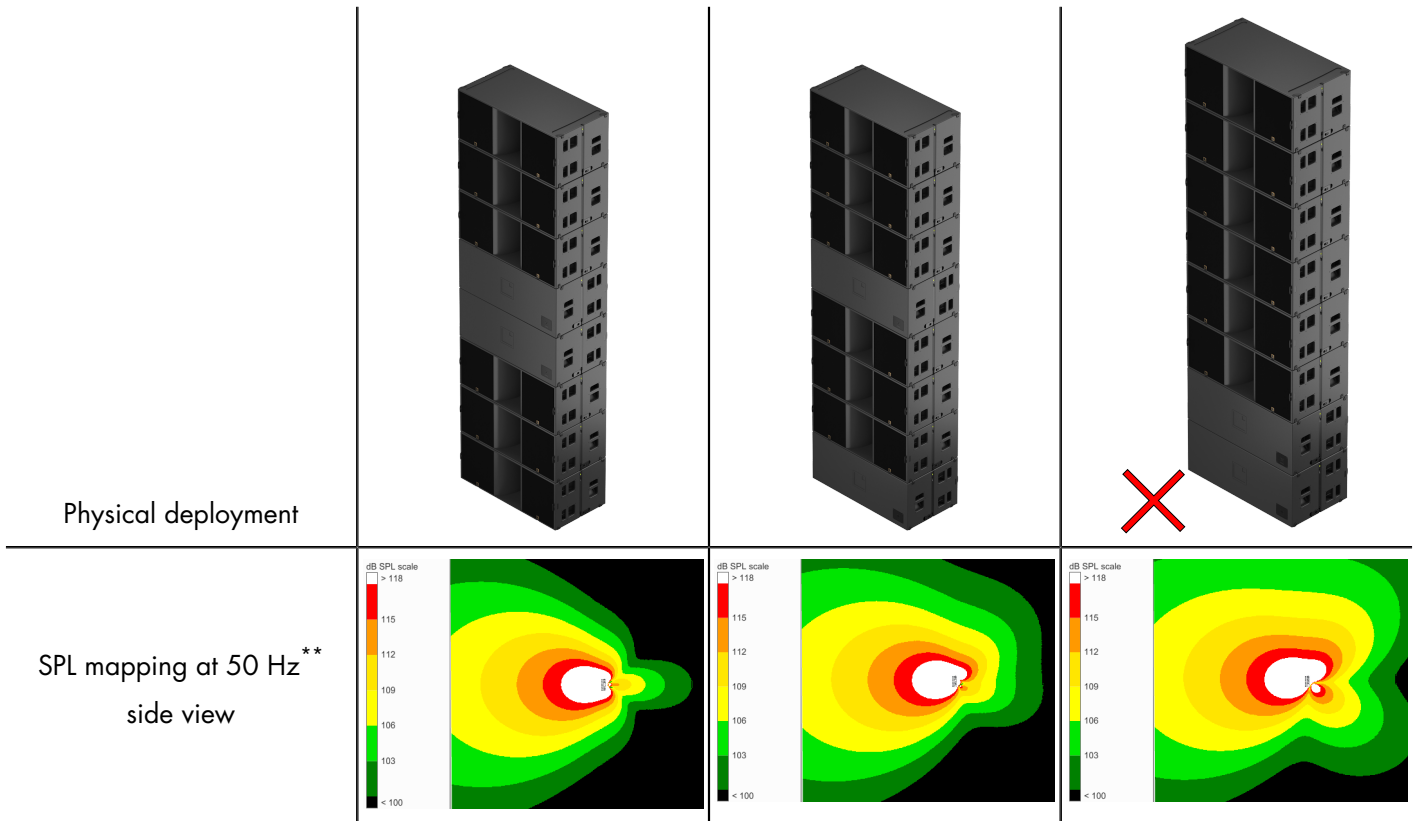
An excessive distance between acoustic centers of forward-facing subwoofers and rear-facing subwoofers reduces front SPL and rear SPL cancellation. Therefore, such deployment should be avoided.

### Horizontal



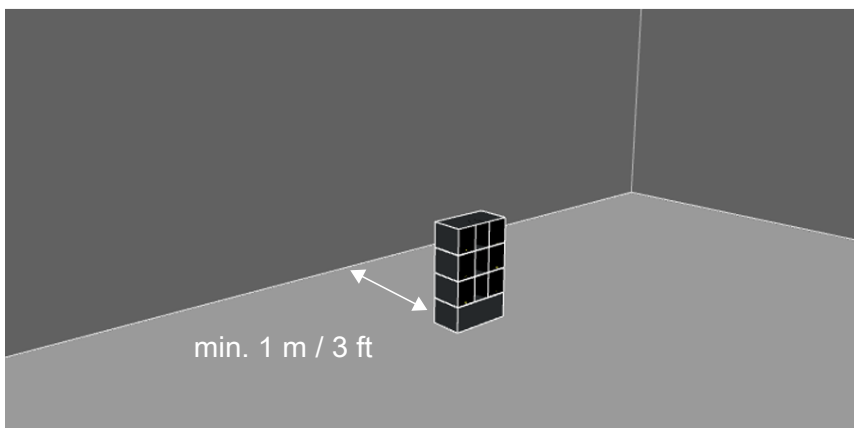
\*\* SPL mappings are simulated with L-Acoustics modeling software Soundvision using the Cardioid C preset for KS28 [KS28\_100\_C]. Mappings with Cardioid Cx presets for subwoofers are not yet available in Soundvision.

## Vertical



## Minimum distance from the wall

For best efficiency of cardioid configuration, a subwoofer array should be positioned at least 1 m / 3 ft from the wall. Below this limit, standard configuration is preferred, and subwoofer arrays should be positioned as close to the wall as possible.



\*\* SPL mappings are simulated with L-Acoustics modeling software Soundvision using the Cardioid C preset for KS28 [KS28\_100\_C]. Mappings with Cardioid Cx presets for subwoofers are not yet available in Soundvision.