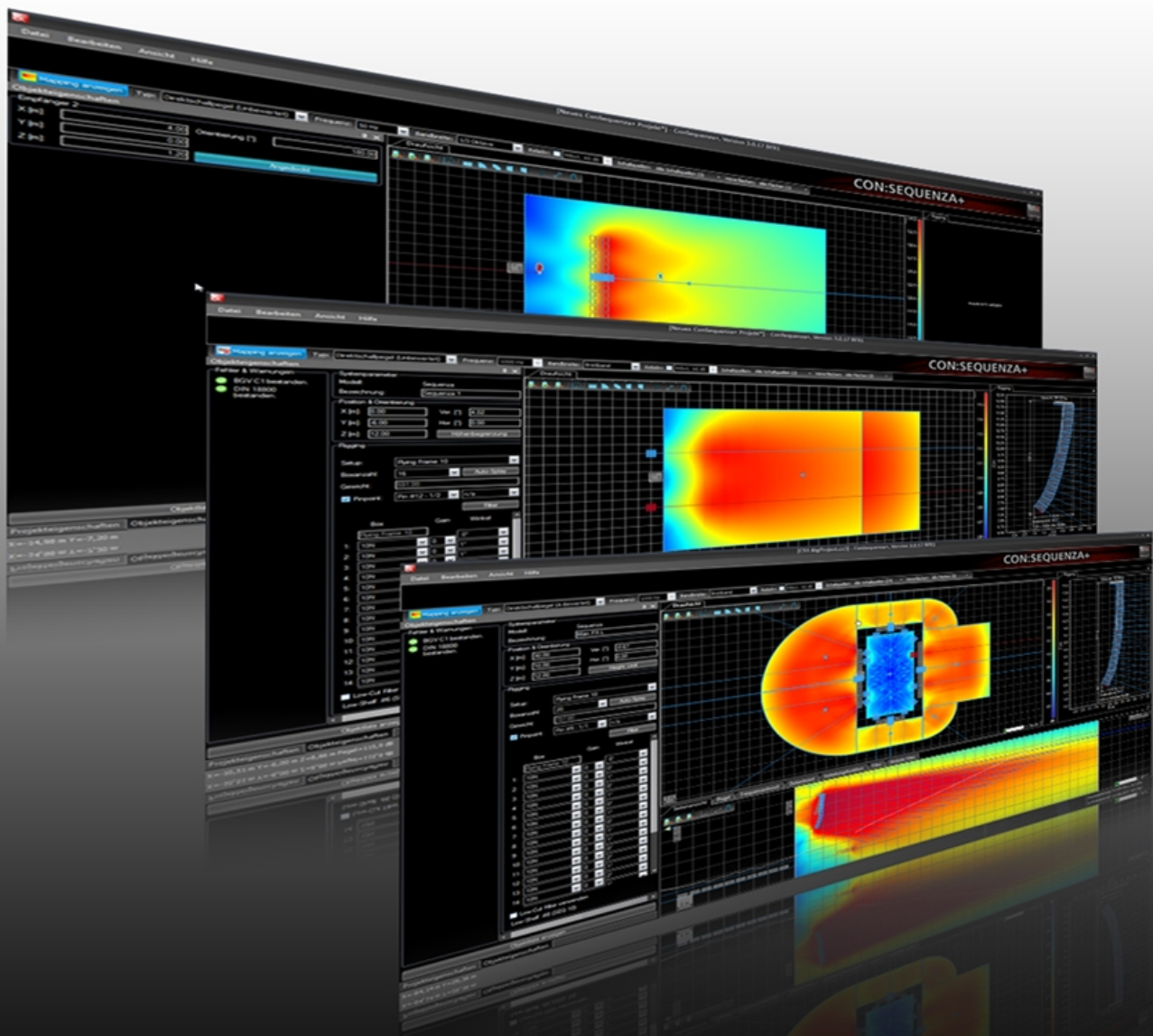


# K&F CON:SEQUENZA+ V3.0



## Operating Instructions

Translation of the original instructions

Version 3.0

Released: 30.08.2016



**Important Information,  
Please Read Before Use!**

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## 1. Introduction

### 1.1 Overview

CON:SEQUENZA+ is a three-dimensional acoustic simulation software for the configuration and modelling of Kling & Freitag line array systems and K&F loudspeakers. The software is free to download on <http://www.kling-freitag.de>.

Jedes Line-Array und jeder Lautsprecher wird in CON:SEQUENZA+ durch eine Systemdefinition abgebildet, welche alle mechanischen, elektronischen und akustischen Eigenschaften des jeweiligen Systems enthält. Diese Systemdefinitionen sind in GLL-Dateien gespeichert und können aktualisiert werden.

Die Software CON:SEQUENZA+ stellt einen gewaltigen Fortschritt in der realistischen Modellierung komplexer Beschallungssysteme dar und bietet folgende Funktionen:

- 3D-Modellierung des Direktschalls mit Abbildung in der horizontalen und vertikalen Ebene.
- Use multiple K&F line array systems and K&F loudspeakers in a single project.
- Capability to use multiple line array systems in a single project.
- Virtual equalizer for tuning a line array in the simulation.
- Support for regular loudspeakers and subwoofer arrays.
- Full frequency range from 20 Hz to 20 kHz.
- Static Analysis based on BGV C1 and DIN 18800.
- High accuracy due to high internal data resolution and GLL data format.

CON:SEQUENZA+ is intuitive and easy-to-use with its three-dimensional coordinates and many useful features. It can be considered a tool for both the end user, who needs to set up the sound system for a show, as well as for the R&D engineer, who is interested in the acoustic qualities of the array design. CON:SEQUENZA+ is the optimal tool for easy and quick prediction of the sound system performance in a given venue.

For more information, including the latest news and updates, visit

- <http://www.kling-freitag.de>

### 1.2 System Requirements

#### 1.2.1 Minimum software requirements

- Microsoft Windows 7, 8, 8.1, or 10.
- Adobe Acrobat Reader 8.0 (or later).
- Microsoft .NET Framework v 4.0, which can be downloaded here:
- <https://www.microsoft.com/en-us/download/>

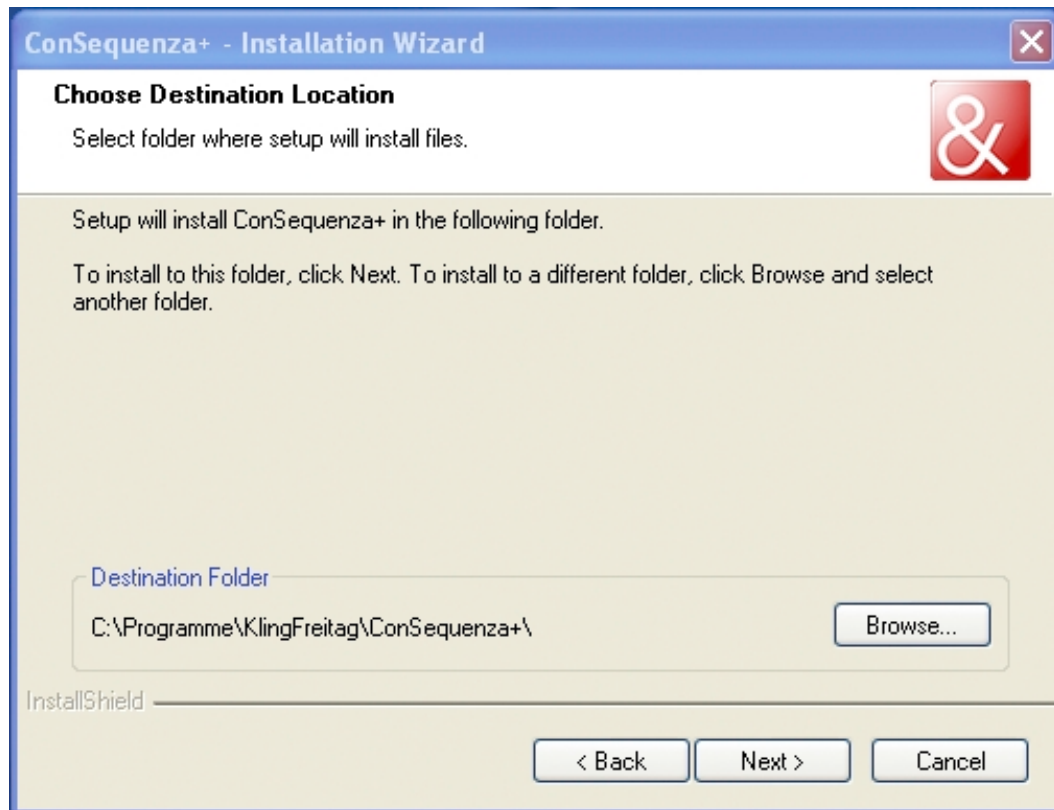
#### 1.2.2 Minimum hardware requirements

- 2 GB RAM (4 GB or more recommended)
- 990 x 600 display resolution (1024 x 768 or higher recommended display resolution)
- 1.5 GHz processor speed or higher (multiple cores are supported and recommended)

For optimal program performance, it is recommended there is at least 30 GB of free disk space available.

## 1.3 Installation

Zur Installation von CON:SEQUENZA+ entpacken Sie das ZIP-Archiv und doppelklicken die ausführbare Datei "setup". Dadurch wird das Installationsprogramm gestartet, welches Sie durch die einzelnen Installationsschritte führt. Bitte beachten Sie, dass für die Installation Administratorrechte auf dem Computer benötigt werden. Standardmäßig wird die Software wie folgt in einem neuen Ordner installiert:



After the installation has completed successfully you can launch CON:SEQUENZA+ using the desktop icon or the Windows Start menu.

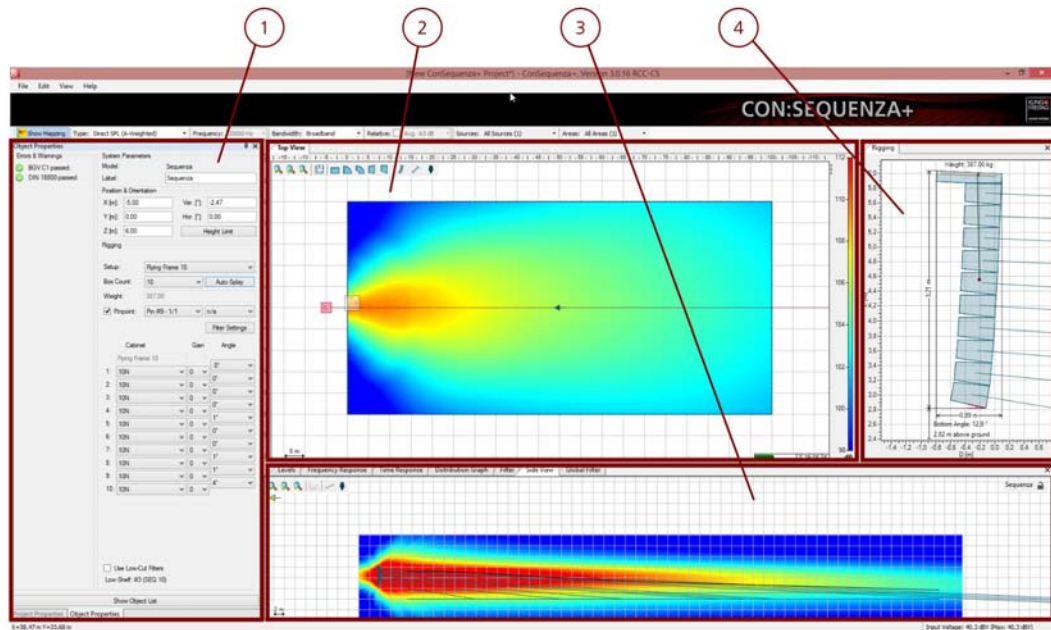
The software can be found in the CON:SEQUENZA+ folder. If you should experience problems with CON:SEQUENZA+ at any time later, try starting the software with its default settings. This option is available as a command from the Windows Start menu.

### 1.3.1 Initial Setup of the Program

CON:SEQUENZA+ has two language options: English and German. Normally the first time CON:SEQUENZA+ is run it will detect the language of your operating system and use it automatically. If you wish to change the default language, press [F9] for the Options window and switch to the Environment page. Then select the desired language from the Language drop-down list at the very top (Chapter 'Environment', page 55).

The installation package of CON:SEQUENZA+ includes the K&F line array series Sequenza and a number of K&F loudspeakers. But if there are new or updated system definition files, that is, GLL or DLL files, you may want to add them to your local database in order to make them available in CON:SEQUENZA+. To do that press Ctrl+I or select 'IMPORT SYSTEM DEFINITION FILE' from the 'EDIT' menu. A file dialog will open which allows you to select the GLL file of interest. Note that the program will make a full copy of this file so you don't have to worry about removing it from the original location after the import (page 25).

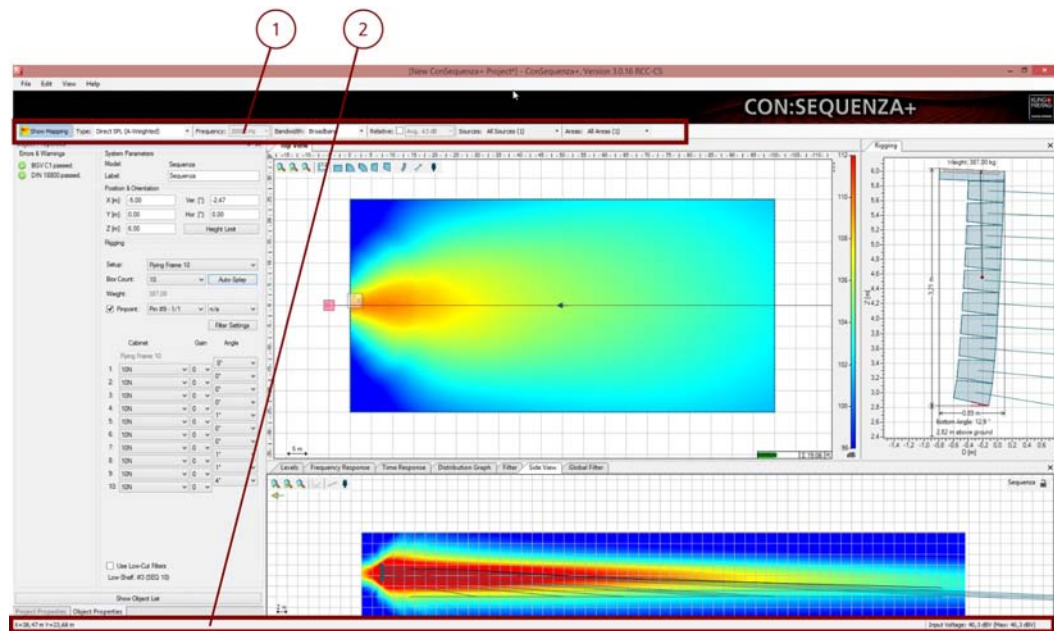
## 1.4 User Interface



The software GUI is subdivided into 4 screen areas:

- Left:** Project Properties (page 11) and Object Properties, used for editing Line Arrays (page 27) and Loudspeakers (page 33), Audience Zones (page 17), Receivers (page 46) and Section Planes (page 59).
- Top:** Top View (page 12), horizontal coverage. This allows selecting, entering and modifying Audience Zones, Receivers, Line Arrays, Loudspeakers and Section Planes in the X-Y-domain.
- Bottom:** Side View (page 16), vertical coverage. This allows entering and modifying Audience Areas for the selected Zone or changing the aiming and position of the selected Line Array system. Additional tabs can be used to select Frequency Response (page 48), Levels (page ) and Distribution (page 46) In the Extended mode, Time Response (page 63), source Filter and Global Filter (page 62) are also available. For information on how to activate the Extended mode (page 56).
- Right:** Rigging view.

Generally, objects are added and selected in the Top View. Their properties can be viewed and modified in the Properties Window as well as in the Side View. The Object Properties window displays the properties of the selected object or, if no object is selected, a list of the objects in the project. You can select an object directly from the list, and then see its properties with the Show Properties button, or go back to the list with the Show Object List button.



At the top of the main window you can find the menu bar, a panel displaying the Mapping Toolbar (page 42).

At the bottom is the status bar. On its left side readouts for mouse position are shown as you navigate maps and graphs of many windows (page 43). On its right side you find the input voltage for the selected Sound Source (page 27) and the error and warning count relative to Sound Sources (page 17) and Audience Zones (page 49). Clicking on the errors and warnings you can open a window listing them in detail.

Note that you can move windows by grabbing their title bar or tab caption. You can also change their size relative to the other windows. Use the command 'VIEW | RESET LAYOUT' to return to the original settings. Use the Store and Restore commands in the View menu to create and recall your own window layouts.

## 1.5 Program Conventions

### 1.5.1 Definition of Terms

There are four major types of objects in CON:SEQUENZA+:

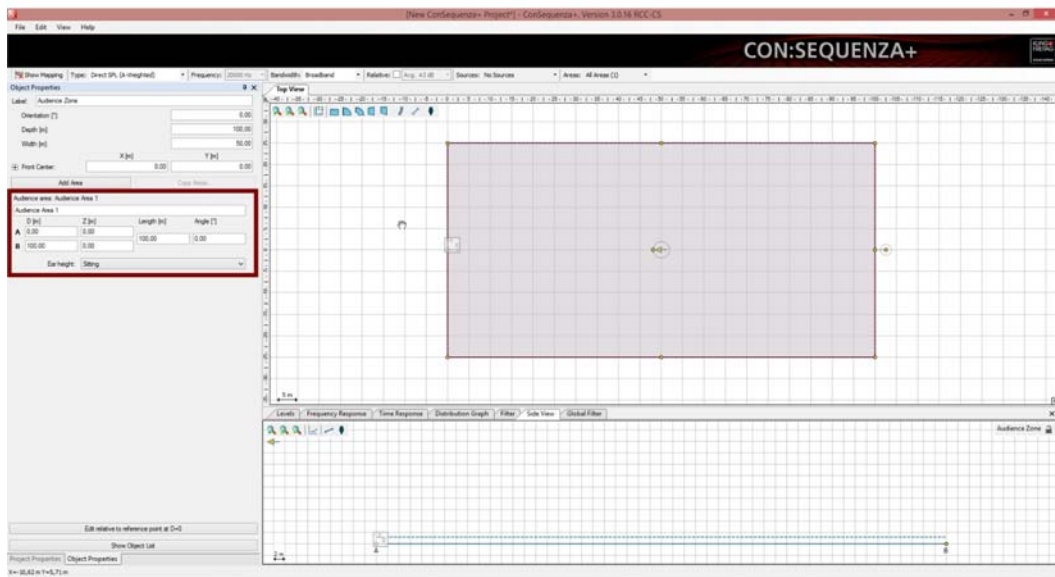
- **Audience Zones** (page 17): Audience Zones are two-dimensional shapes roughly circumscribing the audience in one direction when looking from the stage. They contain one or more Audience Areas. An Audience Area is always part of a Zone (page 18); it is defined by starting and ending points and is stretched out over the width of the Zone: this is the actual area where the audience is located.
- **Sound Source**: Based on the related system definition (GLL), a Sound Source consists of one or multiple point sources each of which is considered the origin of a sound wave. Technically, a Sound Source can be one of two types, either a K&F Line Array (§2.10) or a K&F Loudspeaker. Depending on the properties of the Sound Source, the respective GUI elements may be different. 2633
- **Receiver** (page 46): A Receiver is a representative point for detailed acoustic analysis, such as with respect to the local time or frequency response. This item has no acoustic relevance.
- **Section Plane**: A Section Plane is a user-defined, virtual surface that can be added to the project in order to view mapping data in an arbitrary vertical cutting plane (page 59). Like the Receiver, this item is purely virtual and has no effect on the computational results.



A Project is the set of all objects as defined before combined with the settings associated with the project such as regarding height limits or noise levels. Projects can be loaded from and saved to files with the extension ".cs3".

## 1.5.2 Coordinate System

The main coordinate system in CON:SEQUENZA+ uses XYZ coordinates. The origin marker is displayed by default in the Top View (but can be hidden, page 12) and can be moved to another location (page 55). XYZ coordinates are used in the Object Properties window to indicate the position of all objects. The current mouse location in Top View, Side View and Rigging windows is shown in the status bar, along with the SPL value at that point, if an active Sound Source exists. For all other windows that display a plot you can also see current mouse coordinates in the status bar.



Another important coordinate system is DZ coordinates, used in Side View, Rigging and Levels windows. The DZ origin marker can be optionally hidden in Side View as well. While Z still refers to the elevation from the ground, D is relative to the position of the object whose section is displayed in Side View, and reflects the distance, along the object's main axis, from its reference point: the location for Sound Sources (page 26, page 33) and Receivers (page 46), the front center point for Audience Zones (page 17), or the starting point for Section Planes (page 59). You can see how relative D values relate to XY coordinates in the status bar, while you move your mouse over Side View, Rigging and Levels windows.

The difference between positive and negative D values is given by a simple convention: in short, Sound Sources are expected to be radiating from left to right in Side View, and the audience is expected to face from right to left. For this reason, the Side View relative to Sound Sources is always showing them pointing right, while relative to Receivers, Audience Zones and Section Planes it shows them pointing left. If you have any doubt when using Audience Zones or Section Planes, refer to the yellow arrow appearing in the middle of those objects when they are selected, and pointing to their front center point (for Audience Zones) or starting point (for Section Planes): this is the same arrow that appears in the Side View, pointing left, and these two arrows are oriented in the same direction.

## 1.6 Shortcut List

Here is a list of all keyboard shortcuts available in CON:SEQUENZA+, for quick reference.

Main window (always active):

F1	Help, opens this User's Guide
----	-------------------------------

F4	Show Object Properties or Object List
F9	Options (see Chapter 5)
F10	Scale to Fit (both Top View and Side View)
F11	Select Previous Object
F12	Select Next Object
Alt+F4	Exit CON:SEQUENZA+
Ctrl+N	New Project
Ctrl+O	Open Project (page 25)
Ctrl+S	Save Project (page 25)
Ctrl+Shift+S	Save Project As (page 25)
Ctrl+Z	Undo
Ctrl+Y	Redo
Ctrl+Alt+L	Add Sound Source (page 26, page 33)
Ctrl+I	Import System Definition (page 25)
Ctrl+M	Move Active Sound Sources (§2.16)
Ctrl+T	Change System (when a Sound Source is selected)
Ctrl+U	Move Selected Sound Source to Upper Height Limit (§6.3)
Ctrl+L	Move Selected Sound Source to Lower Height Limit (§6.3)
Ctrl+Shift+J	J-Array setup (when a Line Array is selected, page 27)
Ctrl+Shift+L	Lined setup (when a Line Array is selected, page 26)
Ctrl+Shift+L	Curved setup (when a Line Array is selected, page 27)
Ctrl+Shift+U	Curved setup (when a Line Array is selected, page 27)
Ctrl+Shift+A	Auto Splay (when a Line Array is selected, page 30)
Ctrl+F1 ... F12	Activate a stored layout: individual layout names and shortcuts can be seen in the View menu (page 6)
Ctrl+Shift+R	Reset layout
Ctrl-Alt+C	The automatic mapping colour legend is by default optimized for Top View: use this shortcut to switch optimization between Top View and Side View

Top View (page 12):

Ctrl+C	Copy selected object
Ctrl+V	Paste copied object

Ctrl+Shift+C	Copy Areas (for Audience Zones, see §2.6), Copy Setup (for Sound Sources, see §2.13) 2331
Ctrl+Shift+V	Paste Areas (for Audience Zones, page 23), Paste Setup (for Sound Sources, page 31)
Del	Delete selected object

Moving Active Sound Sources (§2.16):

Ctrl+Arrow right	Move the sources along the positive X axis
Ctrl+Arrow left	Move the sources along the negative X axis
Ctrl+Arrow up	Move the sources along the positive Y axis
Ctrl+Arrow down	Move the sources along the negative Y axis
Ctrl+Page Up	Move the sources along the positive Z axis
Ctrl+Page Dn	Move the sources along the negative Z axis
Ctrl++	Rotate the sources clockwise
Ctrl+-	Rotate the sources counter clockwise

Modifier keys (to be held while performing a mouse action):

Shif	Measure distance (when dragging between two points in Top View or Side View)
Ctrl	Free the Receiver currently being edited (dragged), ignore auto-anchoring (§4.6), in Top View and Side View. Snap Sound Source currently being edited (dragged) to the ground or to the top of the Sound Source below it, in Top View (page 35).

## 2. Venue Definition, Linearrays and Loudspeakers

This section gives a brief introduction into the main features you need to know in order to model a small project with CON:SEQUENZA+. We will explain how to enter a simple venue and then add a Sequenza line array system to it. More advanced topics will be covered in the subsequent chapters.

The next chapters will guide you through the main steps of editing a project. Whenever you make a mistake, you can revert any modification to the project, or recover a reverted modification, with the menu items 'EDIT | UNDO' (Ctrl+Z) and 'EDIR | REDO' (Ctrl+Y).



Tip

In this chapter and in the following ones you will find some yellow frames along the way, just like this one. These contain simple examples to help you learn how to use CON:SEQUENZA+. You can choose to create your own project, or to work on this tutorial project and learn as you progress.

### 2.1 Project Properties

The Project Properties window is located on the left side of the main window. It contains basic information about the project (title, company, author, notes) as well as some settings that are relevant for calculations (temperature, air pressure, humidity).

**Project Properties** [Icon] [X]

Project Title:  
New ConSequenza+ Project

Author:  
[Empty field]

Company:  
[Empty field]

Notes:  
[Empty text area]

Temperature [°C]: 20.0

Air Pressure: Standard (1010 hPa) [v]

Humidity: Standard (60%) [v]

[Project Settings] [Noise Settings]

Project Properties | Object Properties

From here you can also access the Project Settings window, where you can edit ear height values for Audience Areas. Three values are available: Sitting, Standing and Custom. When editing Audience Zones, you will be able to choose one of these values for each Area (page 17). In the Project Settings window you can also define default project-wide height limits for Sound Sources. When editing a Source you can choose whether to apply project limits or to define individual limits (page 27).

**Project Settings**

Ear Heights [m]

Sitting: 1.20 [v]

Standing: 1.70 [v]

Custom: 1.20 [v]

Default Height Limits for all Sources [m]

☐ Upper height limit for sound sources: 8.00 [v]

☐ Lower height limit for sound sources: 3.00 [v]

[OK] [Cancel]

When working in Extended mode, you can access the Noise Settings from a button within the Project Properties window as well (page 65). See page 56 to learn how to activate Extended mode.

## 2.2 Top View

The Top View displays a plan of the venue, and contains all objects in the project: Audience Zones, Sound Sources, Receivers and Section Planes. To select an object, click on it with the left mouse button; to move it, just drag it around the window. In addition, objects have either aiming lines (Sound Sources and Receivers) or yellow handles (Audience Zones, Section Planes) to rotate them and resize them with a simple mouse drag.

The Top View toolbar is located on the top left corner of this window. It includes the following buttons:



Zoom in



Fit the zoom to the project



Zoom out



Add Layout Picture (page 56)



Add Audience Zone (Rectangle, page 17)



Add Audience Zone (Circular Sector, page 17)



Add Audience Zone (Annular Sector, page 17)



Add Audience Zone (Trapezoid, page 17)



Add Audience Zone (Right-Angled Trapezoid, page 17)



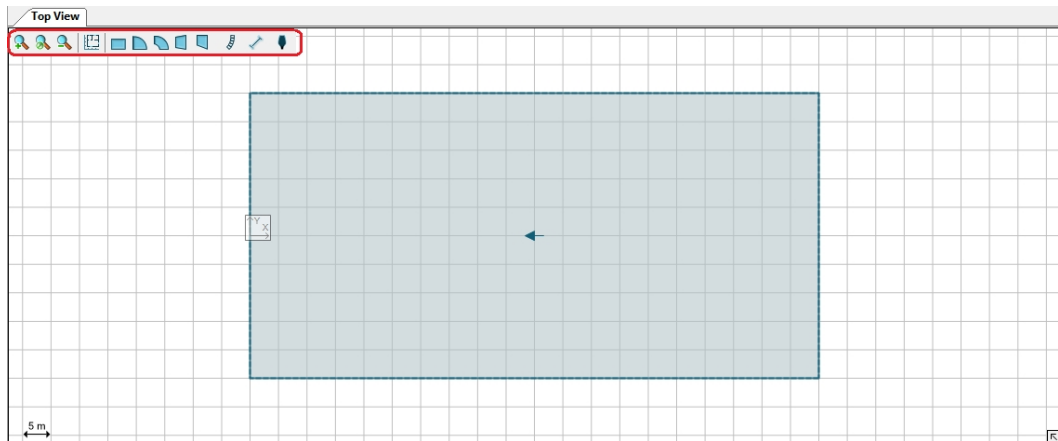
Add Sound Source (page 26, page 49)



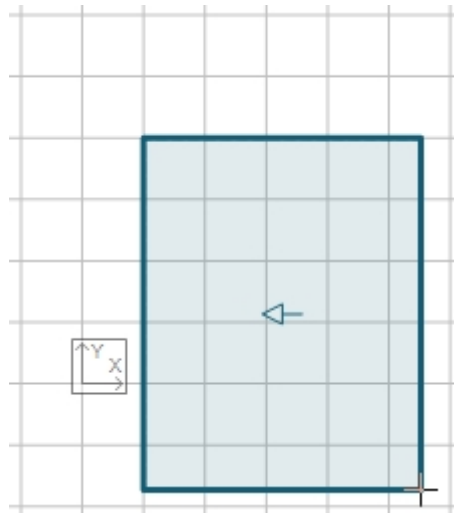
Add Section Plane (page 59)



Add Receiver (page 46)



To add an object, first click on the button in the toolbar corresponding to the desired object. Then move the mouse to the desired location in the drawing, click the left button and drag with your mouse until you are satisfied with the size and orientation of the object. If you click without dragging, the object will be centred on mouse location and take on the default size and orientation, which you can then modify later.



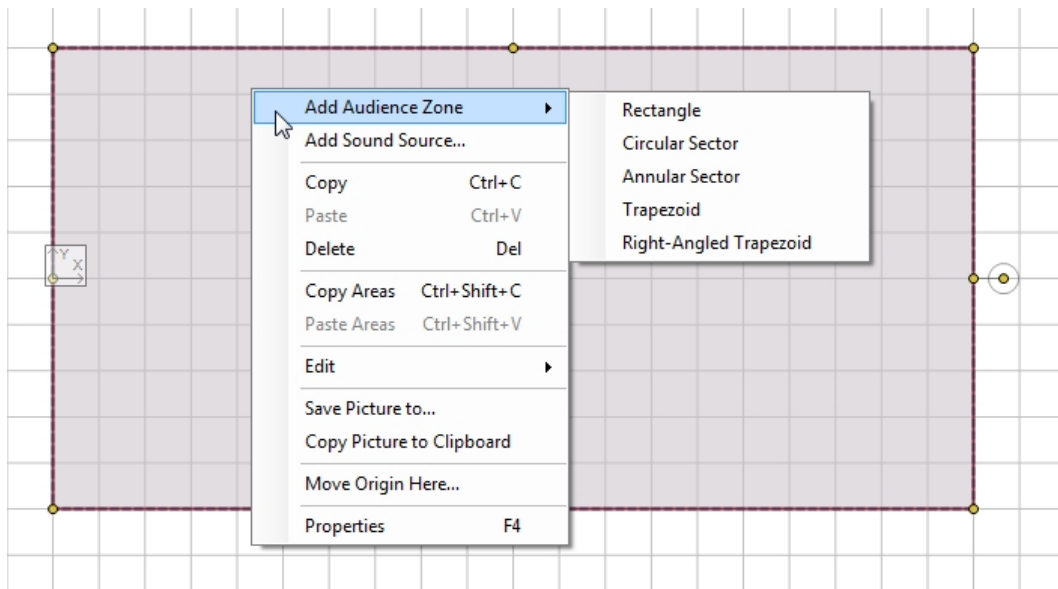
Clicking anywhere in the Top View with the right mouse button will open the context menu, where you can perform any of the following actions:

- **Add Audience Zone:** inserts a new Audience Zone into the Project (Rectangle, Circular Sector, Annular Sector, Trapezoid, Right-Angled Trapezoid), as an alternative method to the toolbar buttons (page 43).
- **Add Sound Source:** inserts a Line Array (page 26), Pre-Configured Subwoofer Array (page 36), or a Loudspeaker (page 33) into the Project, as an alternative method to toolbar buttons.
- **Copy (Ctrl+C):** copies the selected object to the clipboard.
- **Paste (Ctrl+V):** pastes any previously copied object into the Project.
- **Delete (Del):** removes the selected object.
- **Copy Areas (Ctrl+Shift+C):** when an Audience Zone is selected, stores its Audience Areas to be subsequently applied to another Audience Zone (page 23).
- **Paste Areas (Ctrl+Shift+V):** when an Audience Zone is selected, and Audience Areas have been copied from another Zone, pastes them to the selected Zone (page 23).
- **Copy Setup (Ctrl+Shift+C):** when a Sound Source is selected, stores its setup to be subsequently applied to a compatible Source (page 49).

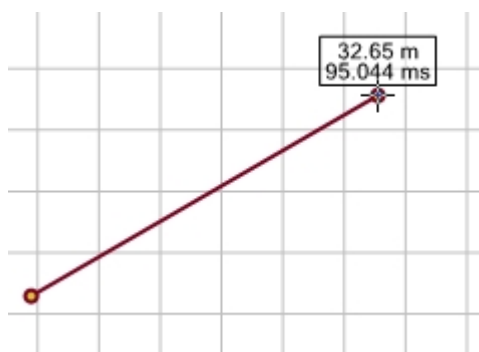
- **Paste Setup** (Ctrl+Shift+V): when a Sound Source is selected, and a setup has been copied from a compatible Source, applies it to the selected Source (page 31).

Please note that copying objects, copying Audience Areas and copying Sound Source setups are three independent functions that do not override or affect each other. However, copying objects and copying pictures (see below) both use the Windows clipboard, and will override each other.

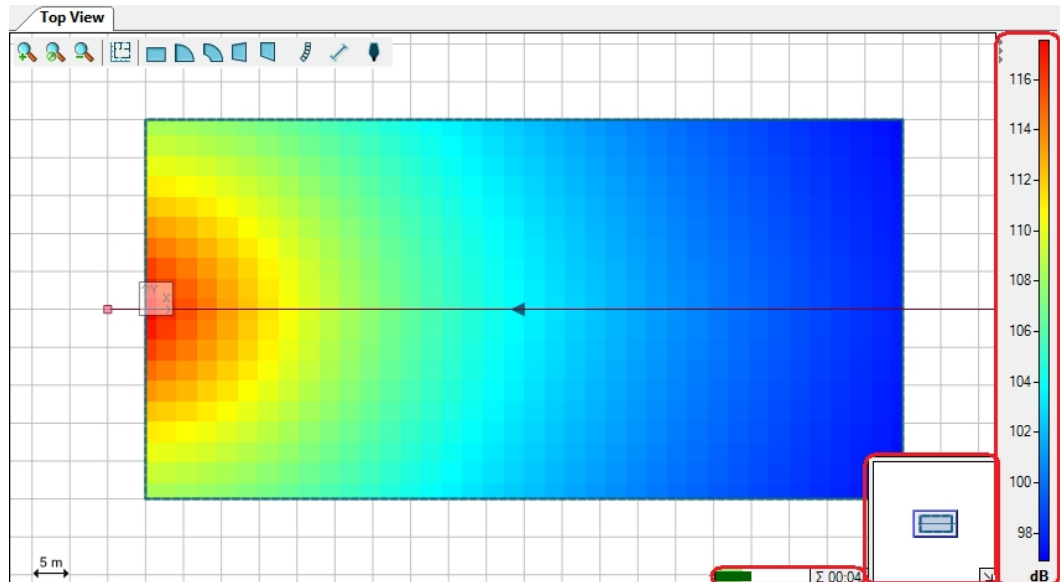
- **Edit**: performs an action affecting the selected object. You can Flip Horizontally, Flip Vertically, Rotate Clockwise, Rotate Counterclockwise.
- **Save Picture to**: saves the content of the Top View as an image file (page 52).
- **Copy Picture to Clipboard**: copies the content of the Top View as an image in the Windows clipboard, to be pasted into any Windows application that supports it.
- **Move Origin Here**: specifies a new origin for the Project coordinates (page 64).
- **Properties** (F4): when an object is selected, shows the Object Properties window for that object if it is hidden and brings it to the top.
- **Object List** (F4): when no object is selected, shows the object list if it is hidden and brings it to the top.



Note that all drawing and editing options snap by default to the displayed grid; this can be changed in the options (page 54). Holding the Ctrl key will also temporarily deactivate the snap to the grid. Holding the Shift key before dragging with the mouse will measure any distance in length and time delay.



On the bottom right corner you can see a miniature map of the whole project, displaying the portion currently being viewed: this small frame can be collapsed if you don't need it. To the left of it, a Mapping Progress Bar will appear whenever mapping data are being calculated. The Mapping Legend appears by default on the right edge of the Top View whenever color mapping is active and visible, but it can also be collapsed by clicking on the three small triangles in the upper left of its window.

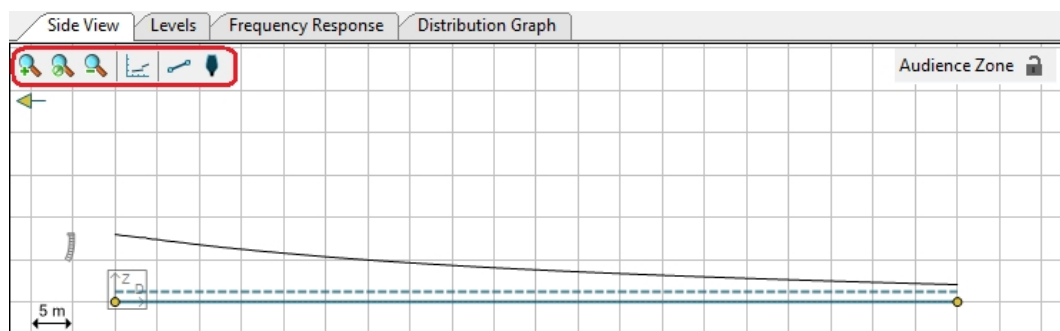


## 2.3 Side View

The Side View has an interface similar to the Top View, except it will not show the whole project, but only a vertical section of it, referring in general to the selected object. The section is taken along the central axis of the object: for Audience Zones this is the line going through the orientation arrow displayed in the Top View, for Sound Sources and Receivers it is the aiming line, and for Section Planes the plane itself.

To understand in which direction you are looking when an Audience Zone or a Section Plane is selected, use the yellow arrow in the top left corner: it replicates the arrow appearing on these two types of objects when they are selected, and points in the same direction. When a Sound Source is selected, the Side View displays it to the left, with the aiming line oriented rightwards; the aiming line points leftwards instead, in the case of Receivers.

You can also see the related Side View of an object which is not selected. Use the Lock symbol in the upper right corner of the Side View window to keep the side view of an object while manipulating another one. This is helpful, for example, when you want to adjust the location of a Receiver in the Side View of a Line Array or change the splay angles of a Line Array while viewing an audience zone.



Just like the Top View, the Side View has its toolbar in the top left corner as well. It displays these buttons:





Zoom in



Fit the zoom to the project



Zoom out



Add Layout Picture (when an Audience Zone or a Section Plane is being displayed, page 56)



Add Audience Area (when an Audience Zone is being displayed, page 18)



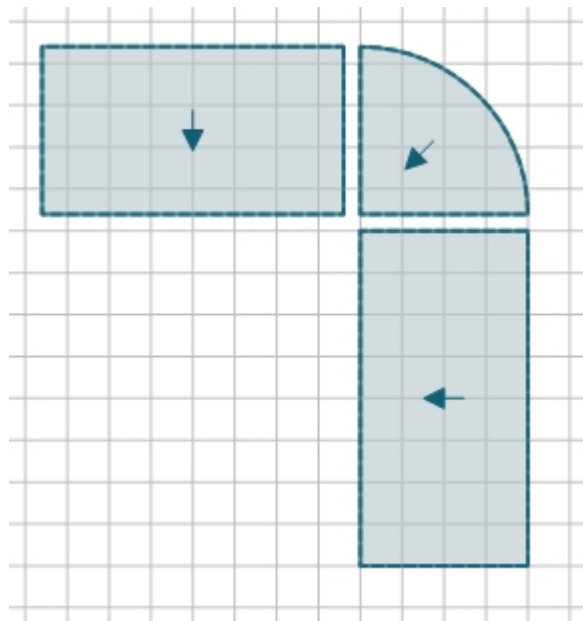
Add Receiver (page 46)

A Mapping Progress Bar will appear in the bottom right corner whenever mapping data are being calculated.

The Side View window is particularly useful to edit Audience Zones (page 17), Line Arrays (page 26), Pre-Configured Subwoofer Arrays (page 36), and Loudspeakers (page 33) with a graphical interface.

## 2.4 Adding Audience Zones

Audience locations are defined on two levels. First, Audience Zones are entered in the Top View and should include all particular seating areas in one direction looking towards the center or stage of the venue. In a second step, a profile consisting of one or multiple Audience Areas is defined for each Zone.

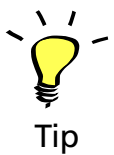
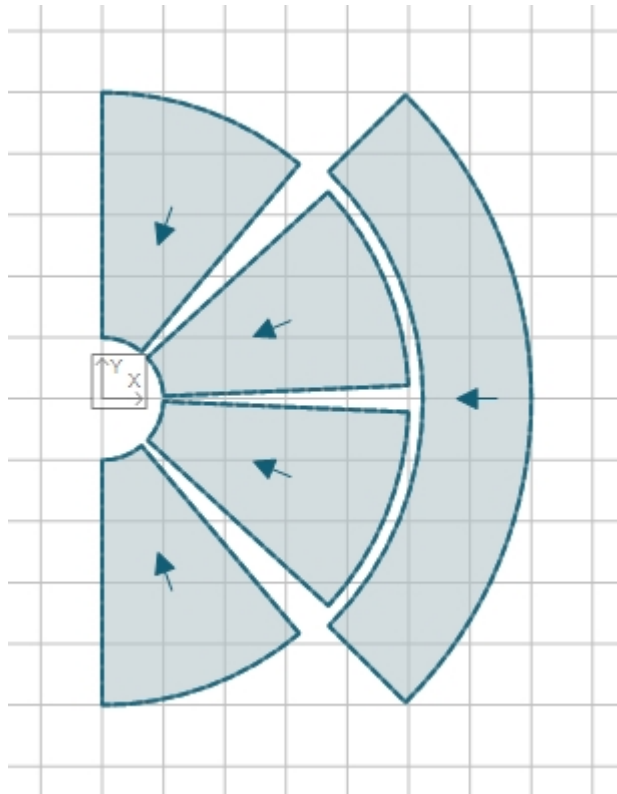


A Zone is basically a simple 2D shape that can be understood as the circumjacent projection of the seating areas in one part of the venue on the horizontal plane. It is defined by a location, orientation and properties specific to the shape, such as the width and depth of a rectangle.

Use the shape icons in the top view to select a particular shape for insertion:



Then add an Audience Zone by clicking or dragging.

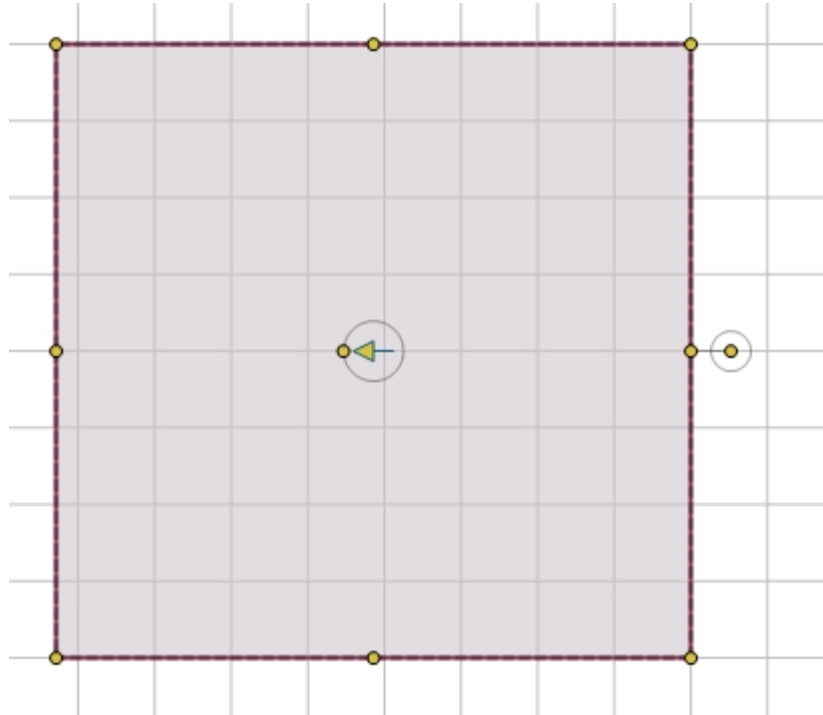


Tip

Draw an amphitheatre similar to the one shown above. You will need five Annular Sectors. Give them meaningful names like "Floor Left", "Floor Middle Left", "Floor Middle Right", "Floor Right", "Balcony".

## 2.5 Editing Audience Zones

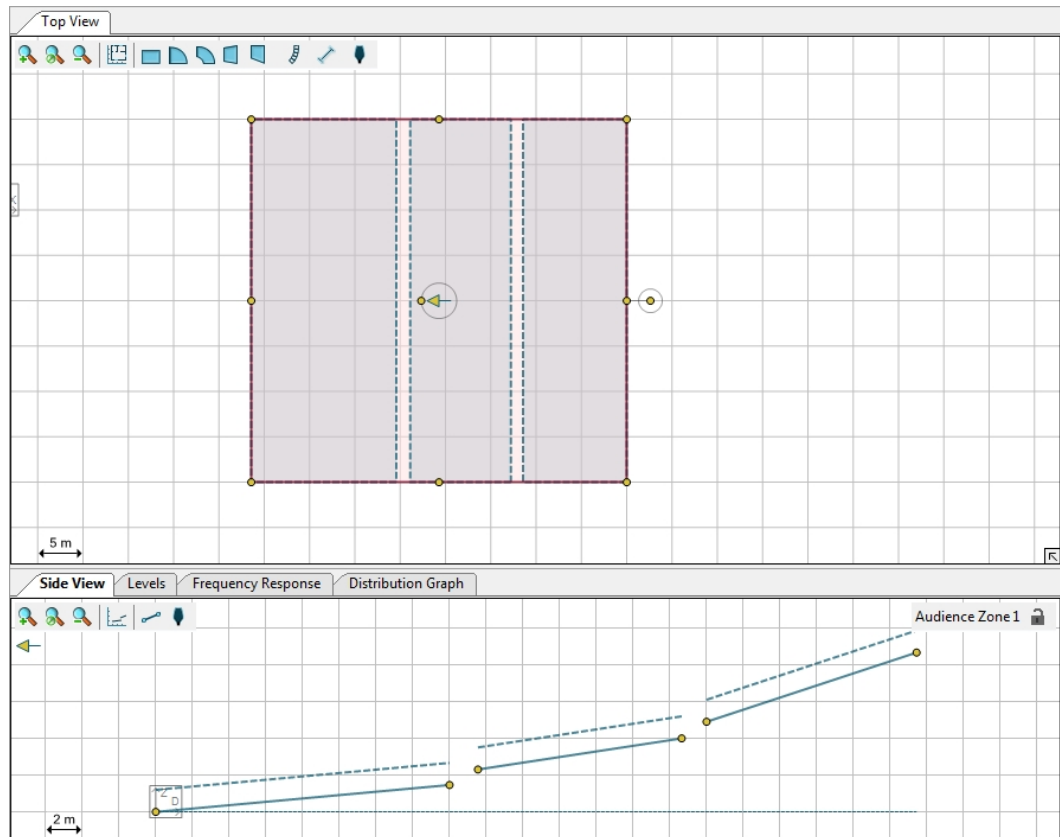
Select a Zone by simple left-click.



When active, the Zone will be highlighted in dark red. It will also show yellow handles that allow you to resize, rotate or change the shape of the Zone. A Zone can be moved relative to other objects by simply left-dragging it with the mouse. The yellow arrow (blue when the Zone is deselected) indicates the viewing direction of the spectators.

An Audience Area is always part of a Zone and is defined by a starting point and an ending point relative to the Zone. There can be multiple Areas inside a Zone. In 3D, these Areas are assumed to be stretched out over the width of the entire Zone, depending on the symmetry of the shape.

Selecting a Zone will show the Zone's profile in the side view.



Use the line icon to enter a new Area for this Zone. Note that you can also left-drag the yellow handles at the ends of an Area to resize it or left-drag the center of an Area to move it. Left-drag the white background of the drawing to move the objects relative to the screen.

The horizontal dotted line at the bottom of the Side View indicates the Audience Zone. The Audience Zone above consists of three Audience Areas denoted by the solid lines with the yellow handles. The dotted lines that are parallel to the Audience Areas indicate the selected listening heights.

**Object Properties** [icon] [X]

Label:

Orientation [°]:

Depth [m]:

Width [m]:

⊕ Front Center:  X [m]  Y [m]

**Audience Area: Audience Area 1**

D1 [m]:  Length [m]:

D2 [m]:  Tilt [°]:

Z1 [m]:  Ear Height:

Z2 [m]:

**Audience Area: Audience Area 2**

D1 [m]:  Length [m]:

D2 [m]:  Tilt [°]:

Z1 [m]:  Ear Height:

Z2 [m]:

**Audience Area: Audience Area 3**

D1 [m]:  Length [m]:

D2 [m]:  Tilt [°]:

Z1 [m]:  Ear Height:

Z2 [m]:

Properties of Audience Zones can also be modified from the Object Properties window. Below is a short description of all Audience Zone types and of the attributes available for each one.

**Rectangle:** a rectangular Zone, with the audience facing one of the edges

- Orientation: the direction the Audience Zone is facing (0° = facing left)
- Depth: the size of the Zone along its axis
- Width: the size of the Zone across its sides
- Front Center, Front Left, Front Right, Back Left, Back Right: position of the main reference points

**Circular Sector:** a Zone whose shape is a circular sector (like a piece of pie), with the audience facing the center point

- Orientation: the direction the Audience Zone is facing (0° = facing left)

- Depth: the size of the Zone along its axis
- Sweep Angle: the angular width of the sector
- Front Center, Back Left, Back Right: position of the main reference points

**Annular Sector:** a Zone whose shape is an annular sector (a portion of a ring), with the audience facing the center of the circle

- Orientation: the direction the Audience Zone is facing ( $0^\circ$  = facing left)
- Depth: the size of the Zone along its axis
- Inner Radius: distance between the inner circle and the center of the circle (outer radius = inner radius + depth)
- Sweep Angle: the angular width of the sector
- Front Center, Back Left, Back Right: position of the main reference points

**Right-Angled Trapezoid:** a Zone whose shape is a right-angled trapezoid, with the audience facing one of the parallel edges

- Orientation: the direction the Audience Zone is facing ( $0^\circ$  = facing left)
- Depth: the size of the Zone along its axis
- not\_found
- not\_found
- not\_found
- Front Center, Front Left, Front Right, Back Left, Back Right: position of the main reference points

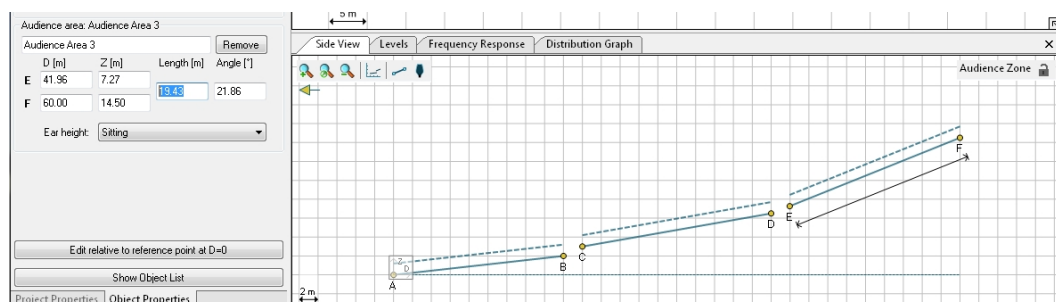
Audience Areas can even be added or removed from the Object Properties window, and their profile can be copied to other Zones (page 23).

When editing an Audience Area note that in the Side View the points that defines each of the Audience Areas within an Audience Zone are uniquely labeled (i.e. A, B, C...) to make identification quick and accurate. The location of each of these points is specified by entering its distance and height from the DZ coordinate origin. These are entered in the D[M] and Z[M] boxes, respectively.

For every Audience Area you can set the following attributes:

- D: the distance from the front of the Zone to the location of the selected point
- Z: the height from the floor to the location of the selected point
- **EAR HEIGHT:** ear height of the audience, selected from three pre-defined values

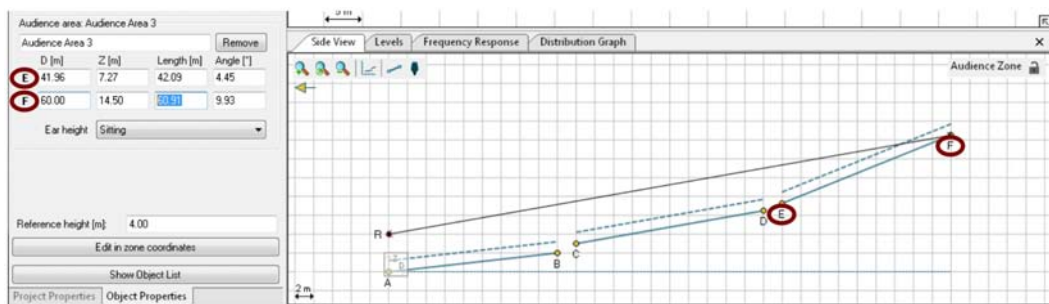
An Audience Area also has settings for LENGTH and ANGLE. When editing in zone coordinates these denote the length of the Audience Area along its axis (diagonally, taking into account the differences in height from the front to the rear of the area) and the angle of the Audience Area with respect to the horizontal plane. Entering values for LENGTH and ANGLE will alter the values of D and Z for the end point of the Audience Area, and vice-versa.



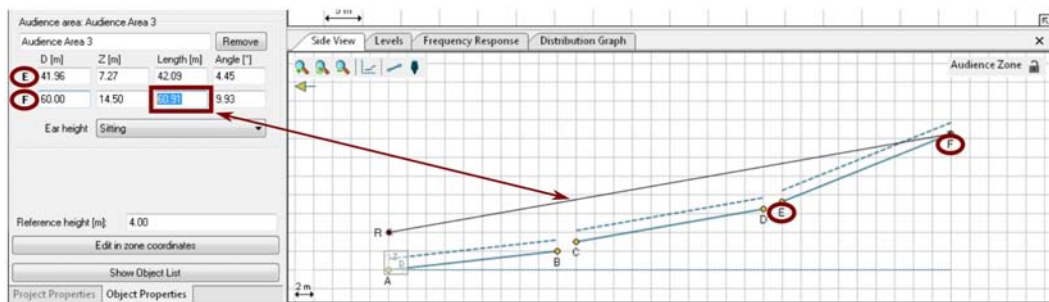
It is also possible to enter the locations of the front and rear points for an Audience Area in polar coordinates. Clicking the EDIT RELATIVE TO REFERENCE POINT AT D=0 button at the bottom of the Audience Area properties enables the use of polar coordinate entry. In this mode a reference point, R, is shown in the Side View. The height of this reference point can be made whatever is convenient for the user. The reference point is always at distance of D=0. The length and angle from this reference point to the front and rear points that define each audience area can now be entered directly.

This polar coordinate entry method makes it very easy to use a laser range finder at a fixed location in a venue and “shoot” the front and rear points of each audience area to find the distance and angle from the reference point to each of these audience points. Note, however, that you will need to choose the origin of the Audience Zone so that it matches your measurement position relative to the venue.

When one of the data boxes is selected (by clicking in it) a line from the reference point to the selected point defining the Audience Area will be shown in the Side View to graphically indicate the item selected.



If two Audience Areas intersect, error messages will be shown, both in the Audience Zone related Object Properties and Side View and in the status bar.

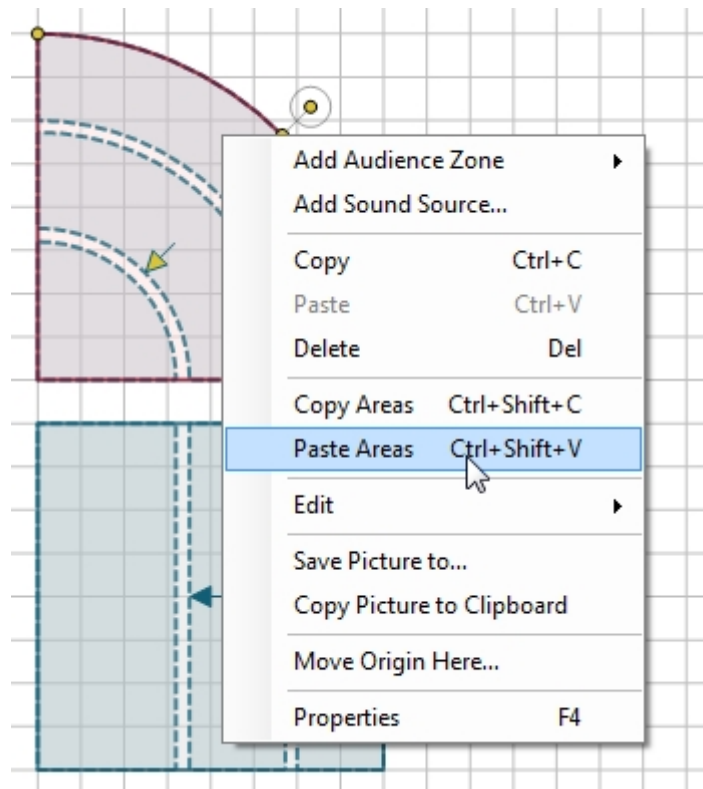


Tip

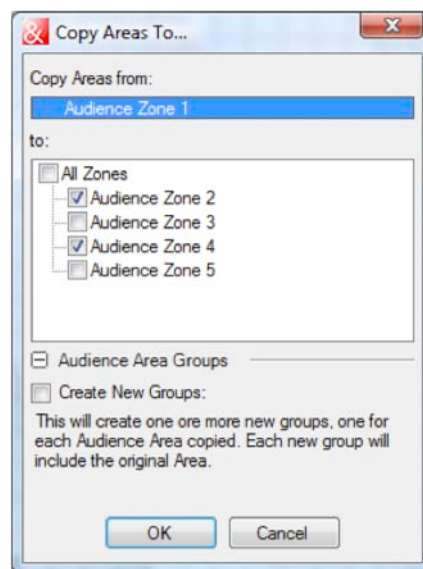
Select one of the floor Audience Zones that you have entered in the previous section, and draw three Audience Areas in it, as shown in the picture. These will be the levels of the amphitheatre. Name the Areas “Top Level”, “Middle Level” and “Bottom Level.” In the next paragraph we will see how to extend levels to other Audience Zones.

## 2.6 Copying Areas between Zones

You might find yourself drawing a venue where several Audience Zones have a similar profile. A typical example is a stadium where all Zones could form a loop consisting of rectangles, annular and circular sectors, but circles extend across all these Zones. The solution for this situation is the “Copy Areas” operation. It can be performed in two ways:



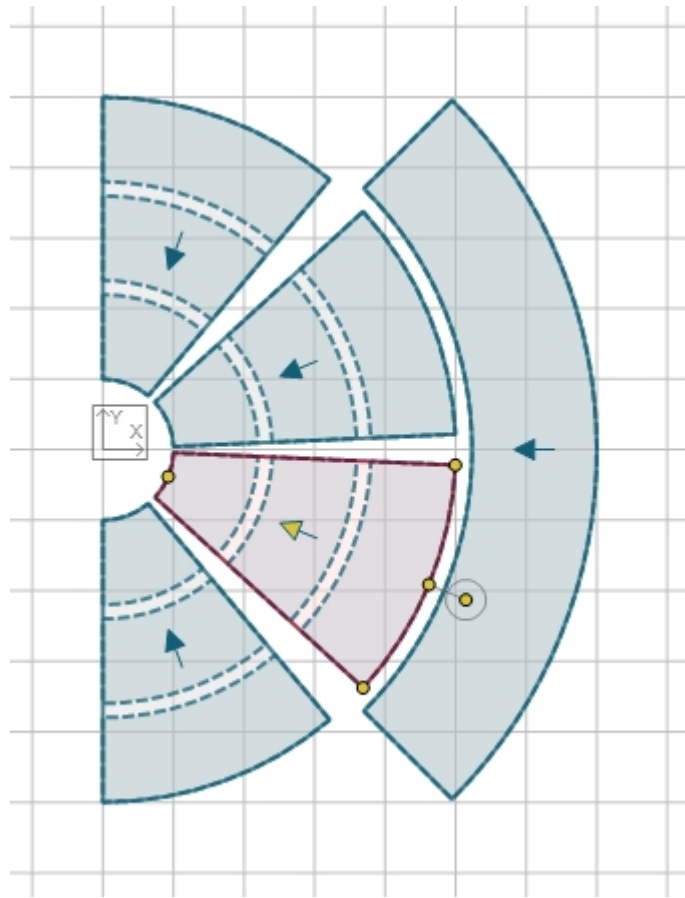
**Context menu in Top View:** the Audience Areas must of course be defined for one of the Audience Zones. Then click with the right mouse button on that Zone: a menu will appear. Select the item Copy Areas; then right click on one of the target Zones and select Paste Areas. Repeat this operation for all target Zones (you do not have to re-copy Areas every time, as they will be kept in memory until they are overwritten by another Copy Areas operation).



**Object Properties window:** once you have defined the Audience Area profile for one Zone, when this is selected, open the Object Properties window (if it is not showing already: either from menu 'VIEW | OBJECT PPOPERTIES', or right clicking in the Top View and selecting 'Properties', or just hitting F4) and click on the Copy Areas to Other Zones button. A dialog will appear listing all Audience Zones in the Project; click on any of them in the list to identify it in the Top View. Check all target Zones for your copy operation. Additional options on Area groups are available in the expandable section on the bottom (page 17). Click OK to validate the selection and run the operation.



Please note that copied Areas will be adapted to the size of target Zones. However, if your Audience Zones have about the same length, no unexpected results will happen.



Tip

Make sure that all your floor Zones have the same depth, as it is logical in an amphitheater. Then select the Zone in which you have drawn the levels, and copy them to all other floor Audience Zones. Try both methods to do so.

## 2.7 Saving Projects

To save a project, click on 'FILE | SAVE' (Ctrl+S); 'FILE | SAVE AS' (Ctrl+Shift+S) will save the current project to a new file, similar to most other programs. Saving a project will also pack GLL and DLL files into the file, so that it can be passed on to other CON:SEQUENZA+ users without having to worry about updated or new files that are needed to open it. However, note that this could lead to quite large project files.

When a project is modified after saving, a star (\*) symbol will appear next to its file name in the main window title bar. This indicates that the current project contains unsaved changes. In this case, if you try to quit CON:SEQUENZA+, you will be asked if you want to save all changes. The same is true for new projects.

## 2.8 Loading Projects

To load a project, click on 'FILE | OPEN' (Ctrl+O). Before loading, if the project contains system definitions, that is K&F GLL or K&F DLL files, that are not present on your hard disk, they will be listed in the Import System Definitions window and you will have the possibility to save every single file to your Database. Alternatively you can click Save All, which will store all system definition files in your database at once.

## 2.9 Importing System Definitions

Besides loading a project, there is another way to add compatible system definitions to the CON:SEQUENZA+ database. If you have one or more GLL files which are compatible with CON:SEQUENZA+ you can click **FILE | IMPORT SYSTEM DEFINITION FILES**: this will open a dialog window where you can select one or more GLL files. After that, all valid sound sources will be listed in the Import System Definitions window where you have the same options described on page 25.

It is also possible to remove (delete) system definitions from the internal database. This can be done using the menu command **'FILE | MANAGE SYSTEM DEFINITIONS....'** A dialog window will open where you can select the sources to be removed. Just click the corresponding systems to highlight them. All selected systems will be deleted from the database as soon as the **REMOVE** button is clicked and the process confirmed in the subsequent dialog. Systems selected on different pages will also be considered for the operation.

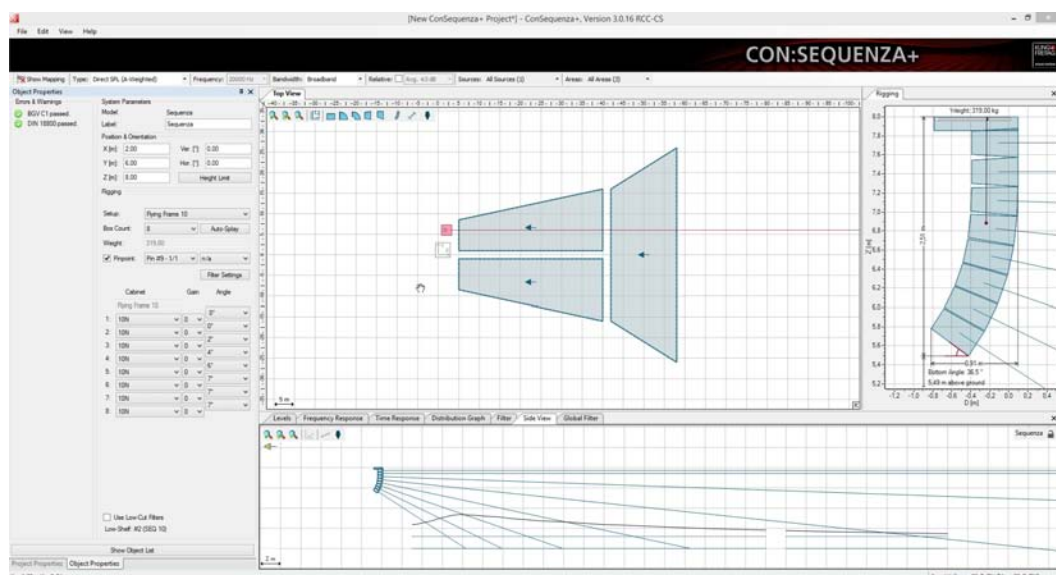
To make things easier, it is possible to narrow down the list using the **SEARCH:** field, which will look for systems and GLL versions with the specified search words. If there is more than one page of systems, you will also be able to scan through the different pages by clicking the arrows below the list of models, by using the mouse wheel, or by pressing [Page-Up] and [Page-Dn] keys. The list is always sorted alphabetically by name. Finally, notice that the window can be resized by dragging its bottom edge. By doing so, the number of displayed items per page can be changed.

Exporting system definitions (GLL files) can be accomplished in a similar manner. This may be useful for sending the files to co-workers or partners, for example. In order to export system definitions (GLL files), select the desired sources as detailed above and press the **EXPORT** button. A new window will appear allowing you to browse to the folder where the exported files will be saved. Choose the desired top folder and press **OK** to complete the export operation.

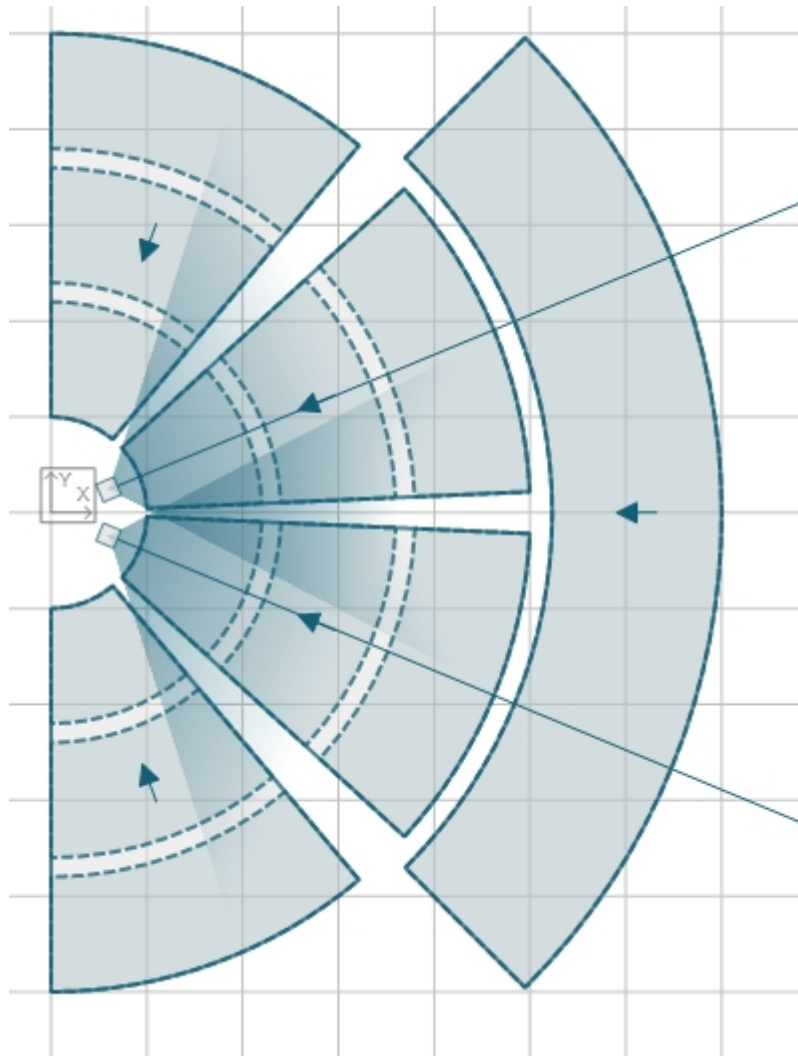
## 2.10 Adding Line Arrays

To enter a K&F Line Array or other kind of K&F Sound Source use the insert icon or use the **RMB** menu that opens when right-clicking the white background of the drawing.

This will bring up a list of available Sound Source types. Select one of them and then left-click or drag to insert it into the top view.



Note that for performance reasons the total number of line arrays, pre-configured subwoofer arrays and regular loudspeakers is limited to 50 Sound Sources overall.



Tip

Add two Line Arrays pointing towards the two middle floor Audience Zones, as shown in the picture. You can name them after the zones where they are aimed.

## 2.11 Editing Line Arrays

In the Top View you can change the location of a Line Array by left-dragging the symbol; or its orientation by left-dragging the aiming line. You can do the same in the Side View, where you can also edit the height of the Array and the tilt angle of the single boxes using their aiming lines.

The same parameters can be fine-tuned in the Object Properties window, where you can define the following attributes:

- **Setup:** lets you choose between setups. A setup can be hanging (flown) or ground stacked
- **X, Y, Z:** coordinates of the array's reference point
- **Ver:** vertical tilt angle of the frame
- **Hor:** horizontal aiming angle of the Line Array (0° = pointing right)
- **Height Limits:** height limits for the current Line Array. Limits can be set to Project default (page 11) or individual for a specific Line Array.


In the Rigging frame you can also change the box number and types and edit the pinpoint mode: you can set one or two pinpoints (manual) or define an angle and let CON:SEQUENZA + find the best fitting pinpoint (automatic). You can also access the Auto Splay function (page 30) which can help you defining an initial array configuration for a given venue.

If the system definition supports input filters, you will see a button labeled FILTER SETTINGS in the Line Array properties. Selecting FILTER SETTINGS, you will be able to simulate the effect of K&F filters for specific elements of the line array (page 62).

### Errors & Warnings

✖ **BGVC1 failed**

✖ **DIN1880 failed**



The system's real tilt angle differs from the one in the simulation. Please select 'Pinpoint' for correction.

### System Parameters

Model: Sequenza

Label: Sequenza

### Position & Orientation

X [m]: 4,11 Ver. [°]: 0,19

Y [m]: 12,59 Hor. [°]: 0,00

Z [m]: 13,57 Height Limit

### Rigging

Setup: Flying Frame 10

Box Count: 8 Auto-Splay

Weight: 319,00

☐ Pinpoint: Pin #9 - 1/2 Delta [°]: 0,23

Filter Settings

	Cabinet	Gain	Angle
	Flying Frame 10		
1:	10N	0	0°
2:	10N	0	0°
3:	10N	0	3°
4:	10N	0	4°
5:	10N	0	6°
6:	10N	0	7°
7:	10N	0	7°
8:	10N	0	7°

☐ Use Low-Cut Filters

Low-Shelf: #2 (SEQ 10)

Show Object List

CON:SEQUENZA+ also supports Line Array presets for J-Array, Lined and Curved Setups. These can be applied under the menu 'EDIT | LINE ARRAY PRESETS'.

not\_found

- not\_found
- not\_found
- not\_found

Limits of various types (e.g. weight, angle) are normally specified in every system definition. If those limits are violated, errors or warning messages will be shown, both in the Line Array related Errors & Warnings frame and in the status bar.

## 2.12 Auto Splay

The Auto Splay function is a valuable tool of CON:SEQUENZA+ that can save you a lot of time when starting to set up your system. Auto Splay optimizes SPL levels produced by the Line Array along its aiming axis, on the Audience Areas that are crossed by it. Levels are calculated at ear height.

**However, note that Auto Splay will only give you a starting point for your system configuration. Depending on the particular system and setup, this function may not yield optimal results. Consult the respective system manual and contact our technical support for more information.**

To use Auto Splay, select the Line Array, go to the Object Properties (F4) and click on Auto Splay. A dialog window will show, making options available about the boxes to be considered. One additional expandable section of the dialog window can be used to select Audience Areas to be optimized.

Another section can be used to define the Auto Splay strategy:

- conventional (default) runs the CON:SEQUENZA+ Auto Splay algorithm with no constraints
- arcuate applies a constant opening angle between adjacent boxes, if possible
- spiral applies a constantly increasing opening angle between adjacent boxes, if possible.
- Keep Array Tilt Angle locks the current setting for the vertical angle. Otherwise this angle will also be adjusted in order to achieve the optimal coverage.

### Start Auto Splay

**Box Selection**

Include the following Boxes in Auto Splay Calculation:

Upper Box: 1: 10N

Lower Box: 8: 10N

☐ Auto-Splay Strategy

☒ Conventional ☐ Keep Array Tilt Angle

☐ Arcuate

☐ Spiral

☐ Target Audience Areas

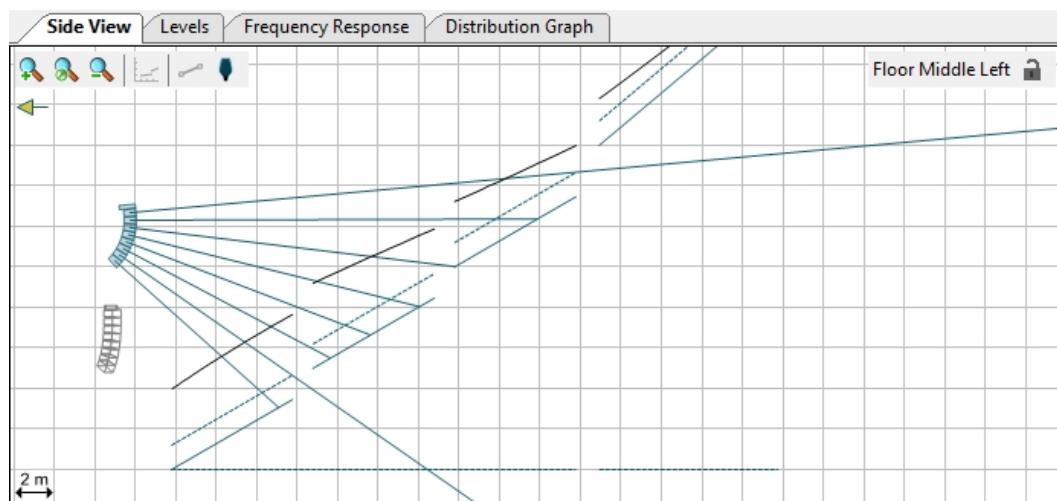
☒ Audience Zone 1

☒ Audience Area 1

☐ Audience Zone 3

☐ Audience Area 1

Auto Splay is calculated with respect to Ear Heights!

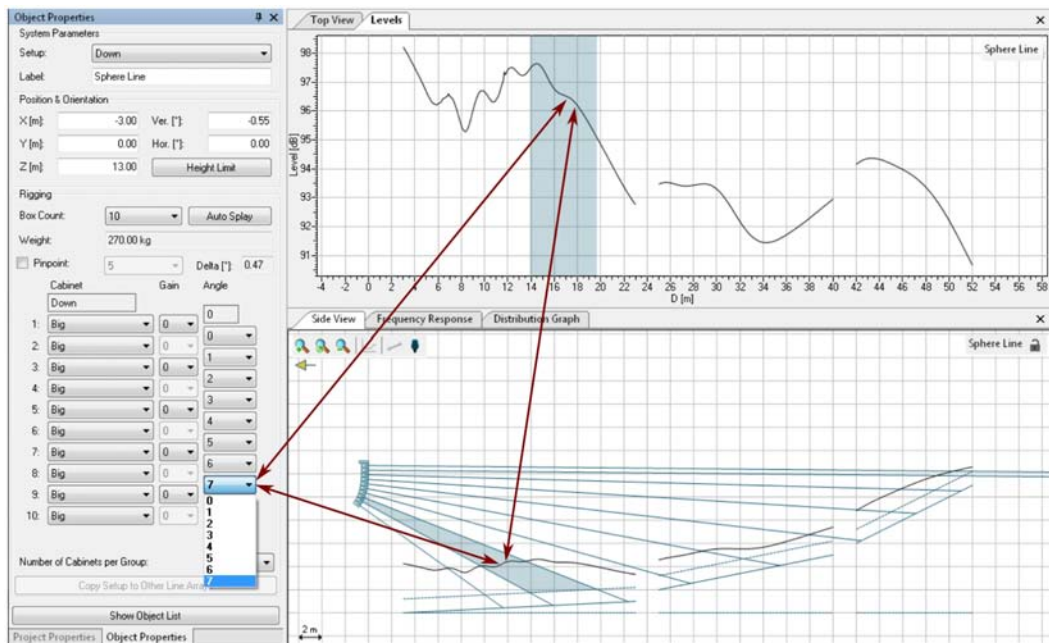


Select one of the two Line Arrays you have placed. Adjust its height, so that it is just above all levels of the floor. Set the number of boxes to 8. Now perform an Auto Splay for all boxes with all floor Audience Areas as the target (conventional strategy). Pay attention to **exclude** the balcony from the optimization.

## 2.13 Overlap Regions

The overlap coverage region between adjacent boxes in an array can be shown explicitly. Hovering the cursor (mouse) over any splay angle drop-down box highlights the overlap region, both on the Levels tab and the Side View tab, defined by this splay angle between the two boxes. On the Side View tab moving the cursor between the aiming lines will highlight the overlap region on the Level tab. It will also make the numerical value bold in the corresponding splay angle box. Moving the cursor along the display on the Level tab will also make the corresponding splay angle box bold, as well as highlight the corresponding overlap region on the Side View tab.

This interaction makes it easy to correlate a peak or dip in the SPL to a specific overlap region of adjacent boxes and their splay angle. Adjustments to the mechanical splay angle can help to make the SPL more uniform.

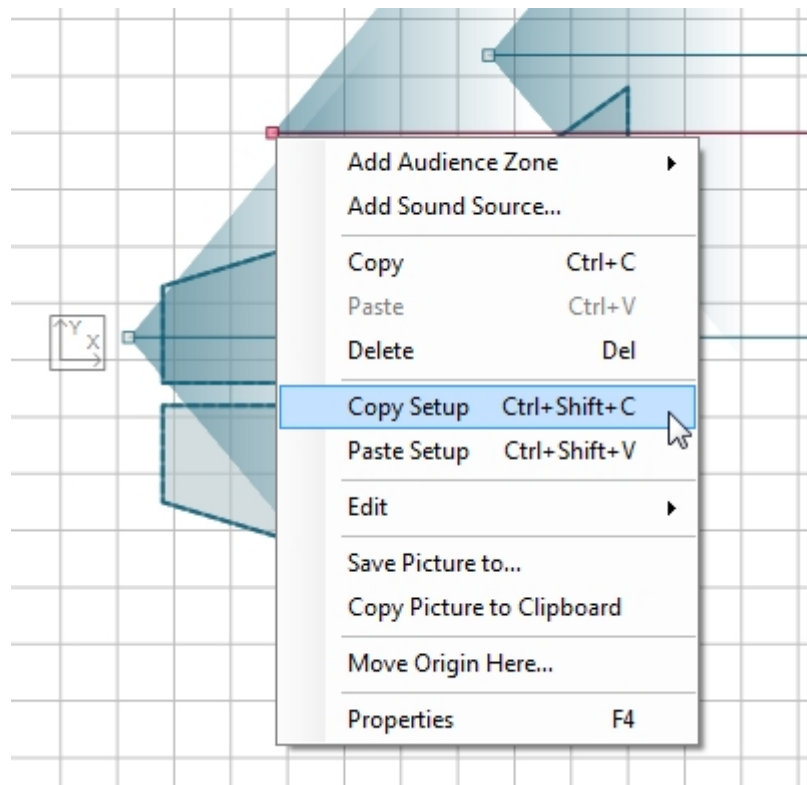


## 2.14 Copying Setups between Similar Line Arrays

In a situation where you have, for example, two Line Arrays in a stereo configuration, you may have to make sure that they are identical. This is why the Copy Setup function exists. Similar to the Copy Areas function between Audience Zones (page 23), it can be performed in the following ways, but only between Line Arrays of the same type.

Paste Setup from context menu in Top View: the rigging must be defined for one of the Line Arrays. Then click with the right mouse button on that Source, and select the menu item COPY SETUP; then right click on each one of the target Sources and each time select PASTE SETUP. A copied setup will be kept in memory until it is overwritten by another "Copy Setup" operation.





Note that the copied information will include box count and types, tilt angles and filters along with global tilt angle and height of the Line Array: this is all the information that has to do directly with rigging setup. Horizontal angles and XY position will not be copied.

Setups can also be copied between Loudspeakers (page 33): in this case, height and tilt angle will be copied, along with all setup information internal to the loudspeaker library.

- Copy the setup you created to the other Line Array. Try it first with the context menu method, then undo the operation (Ctrl+Z) and try it again from the Object Properties.
- not\_found

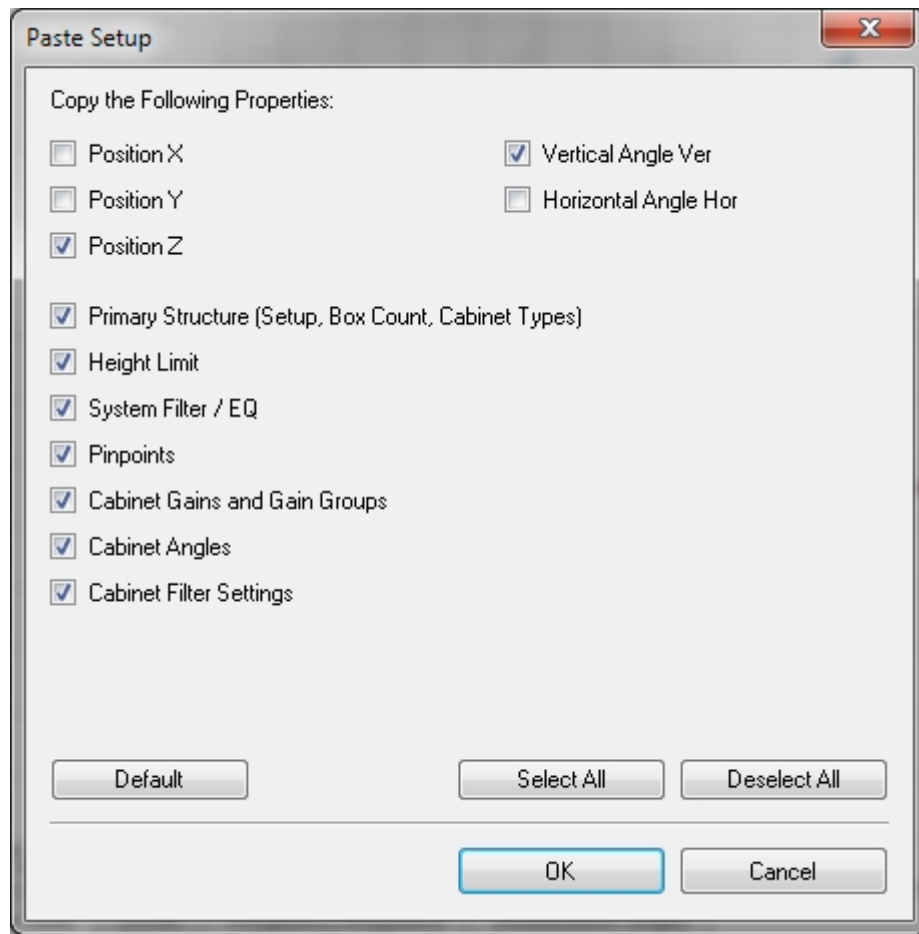
## 2.15 Regular Loudspeakers

Besides the aiming of Sequenza line arrays, you can load and configure regular K&F loudspeakers, as well. This is useful in order to account, for example, for the effect of down-fill or delay loudspeakers in a complete model of the sound system in the venue.

All program functions that are available for line arrays are also available for regular loudspeakers. The only difference is that the properties window for loudspeakers is much simpler than that for line arrays. It allows entering the label of the sound source as well as its location and orientation. If input configurations are defined by the system definition (GLL file), these can be selected in the loudspeaker properties window as well.

Note the FILTER SETTINGS area shows some of the same properties (GAIN, DELAY, and INVERT POLARITY) that are also on the FILTER tab (this tab is only shown when using the Extended Mode, page 56).

Having these three properties available in the Object Properties area should give better access to them for optimizing the directivity of discrete arrays that are built manually (i.e. 'manually configured subwoofer arrays', page 39).



## 2.16 Moving Active Sound Sources

It may be desirable to move a group of loudspeakers such as a manually configured subwoofer array or a group of front fill loudspeakers. This can be accomplished using the 'MOVE ACTIVE SOUND SOURCES' command. This is available from the EDIT menu item and also with the Ctrl+M hotkey. It allows full control to move the currently active sound sources in 3D and to rotate them within the horizontal plane.

In order to activate the sources to be moved, and to deactivate the ones that should not be moved, simply select them through the SOURCES: dropdown menu on the Mapping Toolbar. Notice that groups of sources can also be created so that they can be turned on/off more quickly. In the screen shot below there is an example where only the front fill loudspeakers have been activated.

**Object Properties**

System Parameters

Model: CA1001

Label: CA1001

Position & Orientation

X [m]: 1.97 Ver. [°]: 0.00

Y [m]: 5.00 Hor. [°]: 0.00

Z [m]: 3.00 Rot. [°]: 0.00

Height Limit

Filter Settings

Gain [dB]: 0.0 Invert Polarity

Delay [ms]: 0.000

Input Configuration

passiv

No filter settings available.

After selecting the sources to be moved, click on 'EDIT | MOVE ACTIVE SOUND SOURCES'.

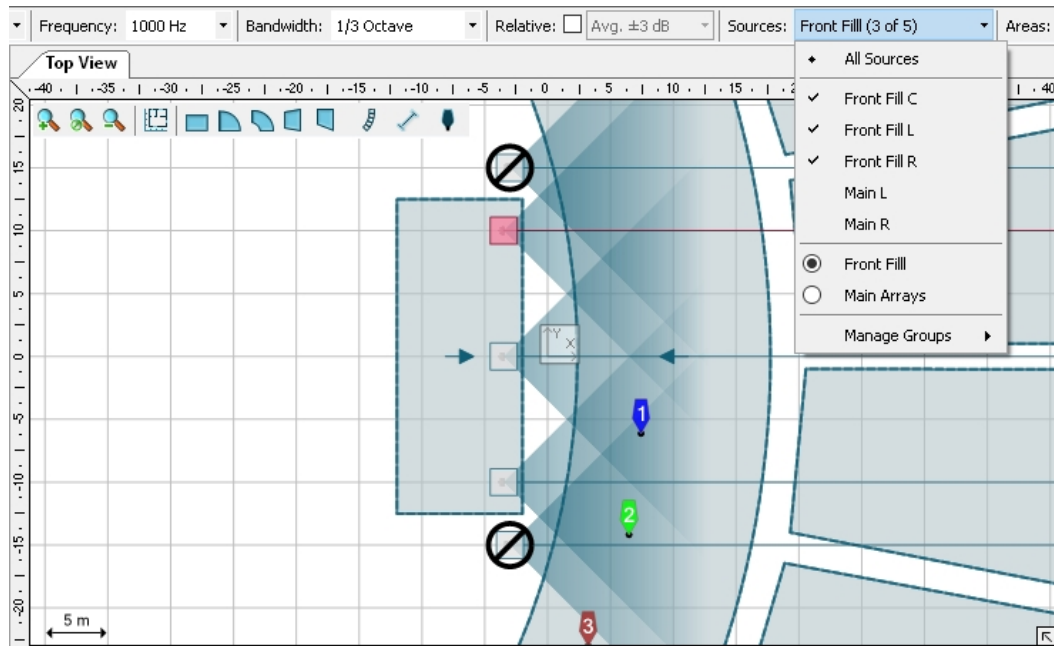
The following dialog box will be shown with control buttons to displace the active loudspeakers by the amount specified in the STEP fields.

1.  $\Delta X$  buttons move the sources along the positive X axis [Ctrl+arrow right] and negative X axis [Ctrl+arrow left]
2.  $\Delta Y$  buttons, along the positive Y axis [Ctrl+arrow up] and negative Y axis [Ctrl+arrow down]
3.  $\Delta Z$  buttons, along the positive Z axis [Ctrl+page up] and negative Z axis [Ctrl+page down]
4.  $\Delta \text{Hor.}$  buttons rotate the sources clockwise [Ctrl++] and counter clockwise [Ctrl+-] around the center of geometry

All displacements are done interactively, while the window is open. After closing it, the total displacement can be easily undone [Ctrl + Z] if needed.

## 2.17 Snap to Loudspeaker and Stacking Loudspeakers

There are some applications where one might want to stack loudspeakers, or simply position a box right above another box. The Snap to Loudspeaker function allows you to easily perform this action. The example below shows a front-fill loudspeaker positioned over a stack of two subwoofers.



This can be accomplished in the Top View, by holding the [Ctrl] key and with the mouse dragging a loudspeaker close to another loudspeaker. The loudspeaker being dragged will automatically be placed on top of the other loudspeaker, adjusting its X and Y coordinates, as well as its height (Z coordinate) and its horizontal angle. This can also be done with other loudspeaker types, such as a stack of line array loudspeakers over subs.

The process of stacking subwoofers in a straight subwoofer array can actually be accomplished using the Subwoofer Array feature, with just a few clicks in its properties window. However, for manually built arrays (usually not straight) the process of manual placing the individual boxes can be greatly simplified using this snap function.

Note that the snap function also works for a dragged loudspeaker if there is no loudspeaker below. In this case the loudspeaker will snap to  $Z = 0$  based on the geometry of the enclosure. This makes it very easy to place loudspeakers exactly on the ground when their reference point is somewhere inside the box.

While the [Ctrl] key is pressed, other existing snap-to-grid features are temporarily disabled so that this Snap to Loudspeaker function is enabled.

### 3. Subwoofers

The use of subwoofers and subwoofer arrays are supported in CON:SEQUENZA+. As defined, a Pre-Configured Subwoofer Array is a group of identical subwoofer-type loudspeakers. The placement of each subwoofer box relative to each other and the signal delay used for each box in the array is controlled automatically by CON:SEQUENZA+ for pre-configured subwoofer arrays. Discrete, manually configured arrays of subwoofers are also possible. Manually configured arrays must be built by the user; placing each box in the desired location and specifying the desired signal delay time for each box.

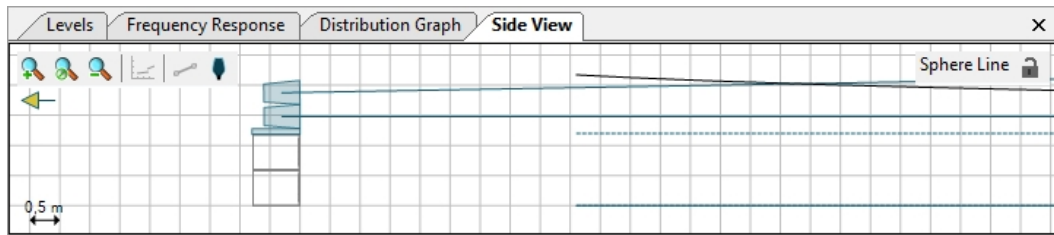
#### 3.1 Pre-Configured Subwoofer Arrays

For pre-configured subwoofer arrays, CON:SEQUENZA+ automatically calculates the proper location of each box in the array, relative to the other boxes, and the required delay times to produce a desired coverage for the subwoofer array.

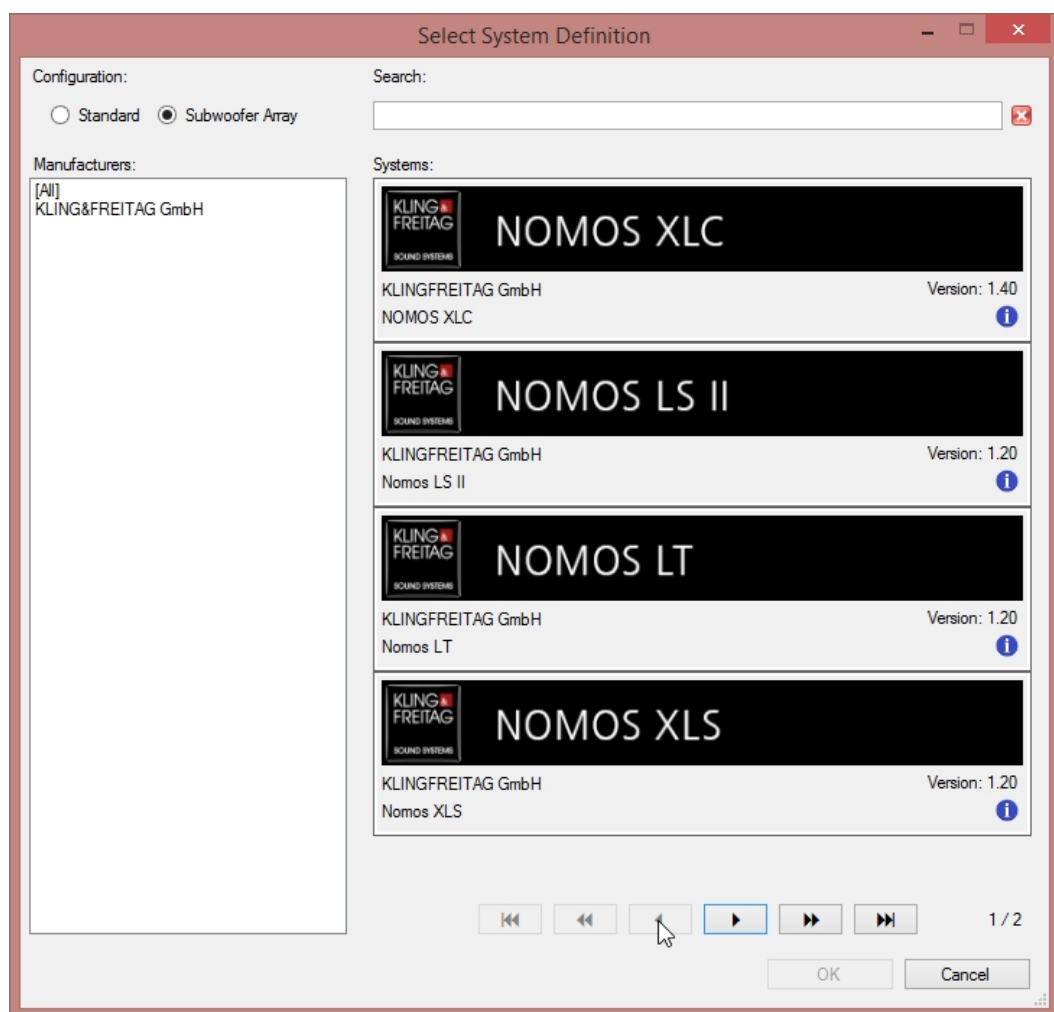
To add a pre-configured subwoofer array to an CON:SEQUENZA+ project click the 'ADD SOUND SOURCE' icon or select 'EDIT | ADD SOUND SOURCE' (CTRL+ALT+L), just like adding any other sound source. In the Select System Definition dialog box choose 'SUBWOOFER ARRAY' at the top under 'CONFIGURATION'. This will do two things.

- it will limit the systems shown on the right side of the dialog box to those GLLs that are defined as subwoofer GLLs and

- when the OK button is clicked to add the selected sound source to the project it will be added as a subwoofer array, not as an individual loudspeaker.

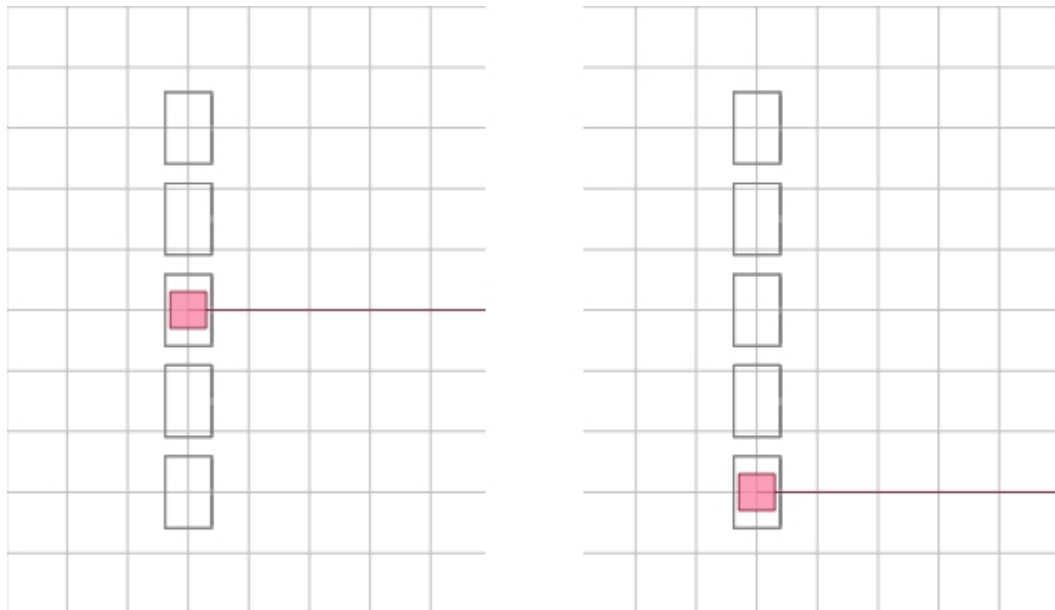


Notice the special icon in the Top View indicating the subwoofers linearly spaced array. It will look like one of the pictures shown below. In the left picture the array shown is symmetric (default). The array shown on the right is asymmetric. The location of the first box and the "on-axis" handle is different for symmetric or asymmetric arrays. For arrays with an even number of boxes, it will be located between the two center boxes.



The Object Properties for a subwoofer array are different than for other types of loudspeakers. Clicking on the subwoofer array in the Top View will show the properties.

The first option is the array setup, which can be symmetric or asymmetric with respect to the source location. Selecting the SYMMETRIC setup will place the individual sources symmetrically with respect to the center of the array, distributing loudspeakers evenly on each side. The ASYMMETRIC setup will place sources only on one side of the array. The two options will be clearly distinguished in the Top View (see previous picture).



The POSITION & ORIENTATION OF CENTER section defines the reference location for the array, according to its center (for symmetric arrays) or according to the first box (for asymmetric arrays). Note that all loudspeaker locations in the subwoofer array are relative to this reference position, including the horizontal angle of the array. This can be verified in the BOX LOCATIONS & DELAYS section of the Object Properties. For instance, in the screen shot above the first subwoofer box is located at -2.0 meters from the reference location of the array (in this case, the center). The third subwoofer box is located at the reference point, or center, of the array. Note the zero meter distances from the reference location. This convention should make the system implementation in the venue a much easier process compared to when absolute coordinates are used.

In the CONFIGURATION section complementary definitions for the array can be specified. The BOX COUNT parameter selects the number of subwoofer boxes that are to be placed horizontally in the array. These will make up the main structure of the array. The STACKED BOXES drop-down box selects the number of subwoofer boxes to be stacked on top of each other to form columns. Thus the total number of subwoofer boxes used in an array will be the number specified in the BOX COUNT times the number specified in the STACKED BOXES.

It is possible to either specify the ARRAY WIDTH, and let CON:SEQUENZA+ calculate the spacing between each subwoofer box (or columns of subwoofer boxes), or specify the desired SPACING between the center of adjacent subwoofer boxes, and let CON:SEQUENZA+ calculate the corresponding array width. Either way, the distance between the elements in the array will dictate the APPROXIMATE FREQUENCY LIMIT [HZ] for the array. The smaller the spacing between elements the higher the frequency for which the coverage pattern can be controlled.

The COVERAGE ANGLE [°] field can actually be used to specify the desired coverage and let CON:SEQUENZA+ do the delay calculation work. For a desired goal, delay values for each element will be automatically calculated and the results will be mapped for verification. Notice that the possible minimum coverage angle will largely depend on the array size. In other words, a large array width is required for a small coverage angle at low frequencies.

Note that on the one hand the maximum frequency limit is governed by the spacing between elements. While on the other hand the minimum coverage angle is dictated by the array width. It is clear that for good narrow coverage and considerable bandwidth, the array must be composed of a large number of elements closely spaced. The degree to which this criterion is met defines the compromise for the project.

Finally, if input configurations or filter settings are defined in the system definition (GLL file), these can be selected from the subwoofer-array properties window. If available, the section can be viewed after scrolling down the Object Properties tab.

An example of the subwoofer array capabilities is illustrated below showing the coverage control. This array is comprised of 8 columns with 2 stacked subwoofers (2x 18 inch drivers in each box), spaced 1.5 m apart. The coverage angle goal is set to 40 degrees.

Object Properties

System Parameters

Model: Nomos LT  
Label:   
Setup: ☒ Symmetric  
☐ Asymmetric

Position & Orientation of Center

X [m]:  Hor [°]:   
Y [m]:   
Z [m]:

Configuration

Box Count:   
Stacked Boxes:   
Array Width [m]:   
Coverage Angle [°]:   
Spacing [m]:   
Approx. Frequency Limit [Hz]:

Box Locations & Delays

#	X [m]	Y [m]	Z [m]	Delay [ms]	Total Delay [ms]
1	0,00	-2,00	0,00	0,0	0,0
2	0,00	-1,00	0,00	0,0	0,0
3	0,00	0,00	0,00	0,0	0,0
4	0,00	1,00	0,00	0,0	0,0
5	0,00	2,00	0,00	0,0	0,0

Filter Settings

Input Configuration  
  
Filter:

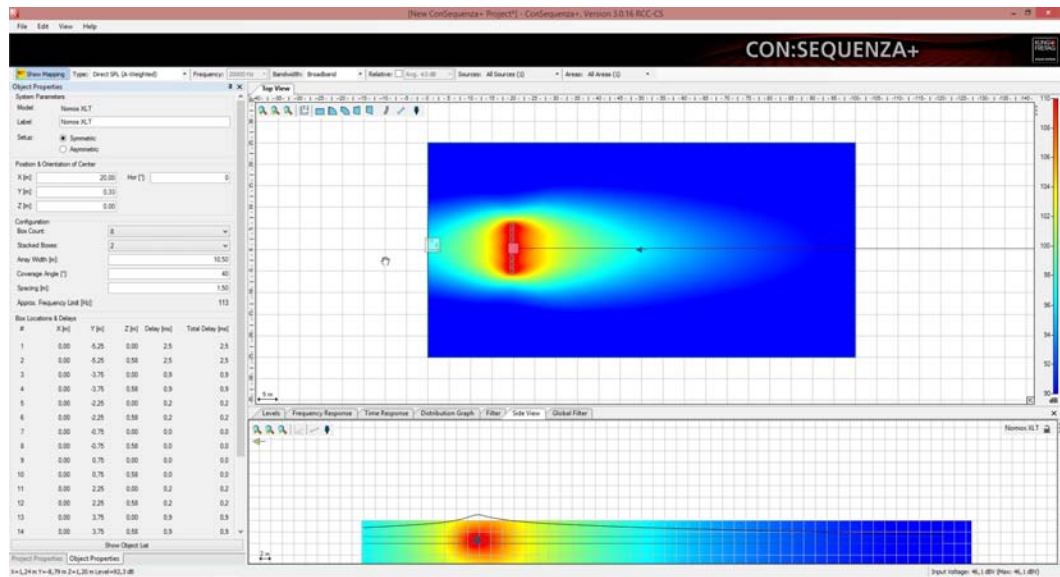
## 3.2 Manually configured arrays

Manually configured subwoofer arrays are another way to build subwoofer arrays in CON:SEQUENZA+. Note that this is different than the Pre-Configured Subwoofer Arrays feature (page 36) which allows boxes within a defined subwoofer array to be positioned automatically by CON:SEQUENZA+ based on entering a few setup and performance parameters.

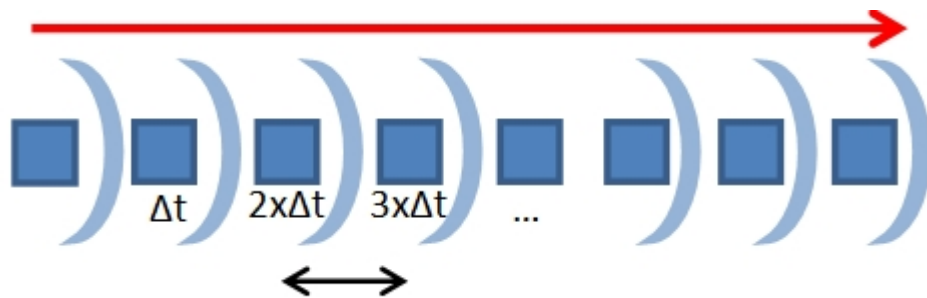
Building manually configured arrays allows much more flexibility. Many more types of subwoofer arrays are possible such as end-fire, simple cardioid, stacked cardioid, asymmetrical cardioid, etc. When building manually configured subwoofer arrays it is necessary to adjust the gain, delay, and polarity of the different boxes that make up the array to yield the desired directivity. To make this easier in CON:SEQUENZA+ these three loudspeaker properties are now more readily available.

Modeling manually configured subwoofer arrays is possible via complex summation (i.e. both magnitude and phase) in the low frequency region within CON:SEQUENZA+. Users should acquaint themselves with this feature detailed in §4.3. 43

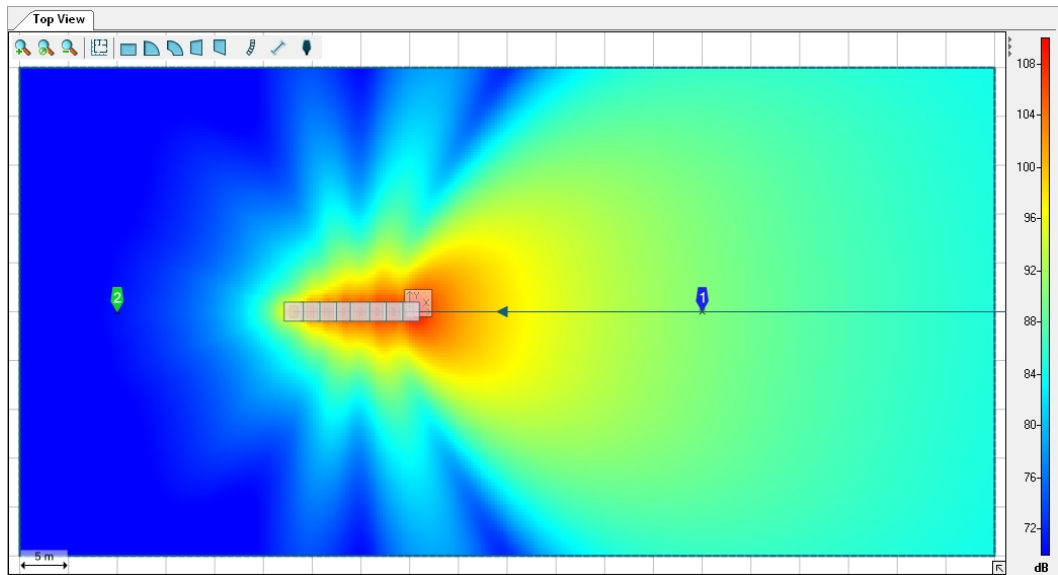
Some examples of manually configured subwoofer arrays are shown below. In each case the mapping is for 50 Hz and a bandwidth of 1/3 octave.



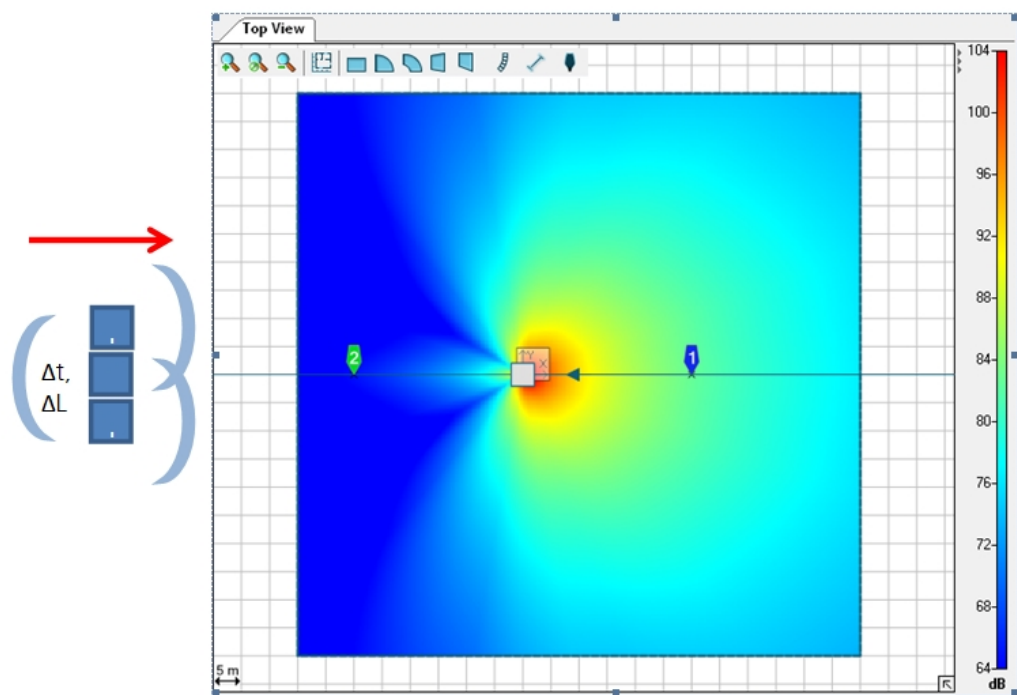
### 3.2.1 End-Fire Array



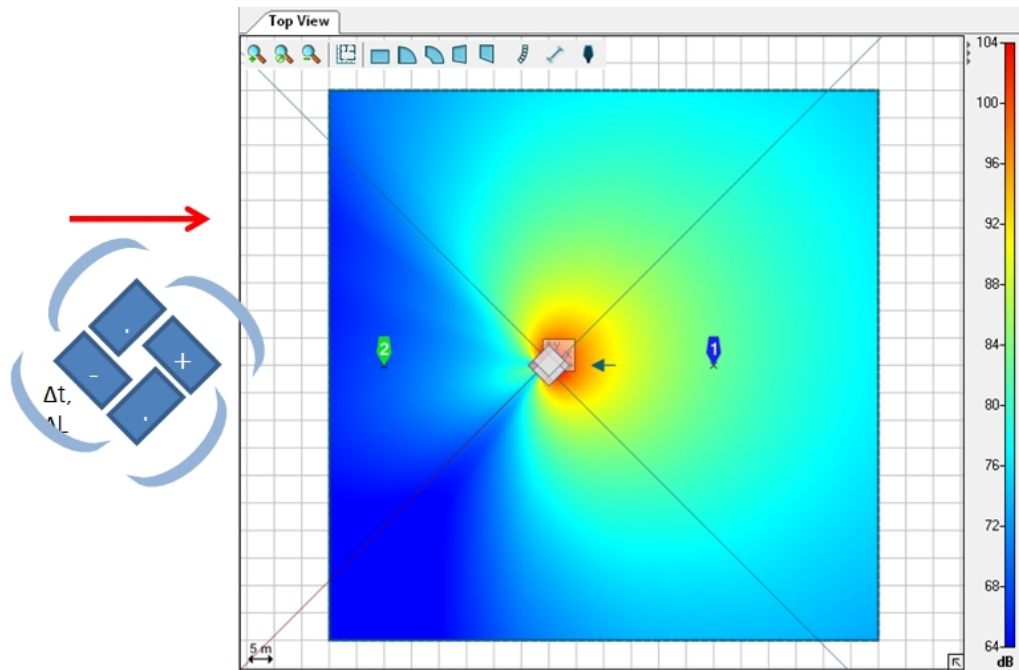




### 3.2.2 Stacked Cardioid Array



### 3.2.3 Asymmetrical Cardioid Array "Vortex"



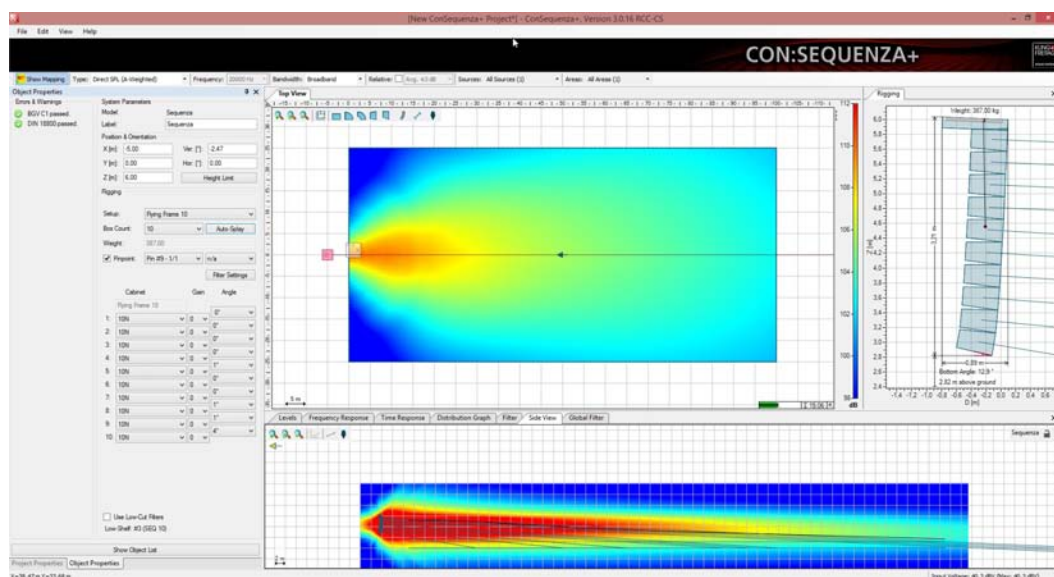
## 4. Mapping and Calculation Results

This chapter explains how to exploit the calculation and mapping capabilities of CON:SEQUENZA+, in order to have an optimal view of how your setup works in the field.

### 4.1 Mapping Toolbar

The Mapping Toolbar is located by default on top of the main window. This is the place where you can edit the main parameters about how mapping is calculated and drawn.

To enable the SPL mapping display, select Show Mapping.



Use the Type dropdown menu to select the weighting (Z – none or A-weighting) or the Signal to Noise mapping (only in Extended mode, (page 56) on how to activate it; Noise Settings that are defined will apply (page 65). Use the Frequency and Bandwidth dropdown menus to select the kind of mapping to be shown, either broadband or band-limited (1/3 octave, 1 octave, 3 octaves) and in the latter case the center frequency. You can use the Relative option and menu to highlight areas whose pressure value lies outside a certain tolerance margin from the average value. Finally, you can use the Source and Areas menus to select which Sound Sources and Audience Areas are to be included in the mapping, and to store and recall Source groups (page 49) and Area groups (page 23).

## 4.2 Calculations Background

All SPL calculations in CON:SEQUENZA+ are limited to the direct field. Also included in the calculation are air attenuation effects according to ISO 9613. Shadowing and ground or side wall reflections are not considered. Wind effects are also not taken into account.

CON:SEQUENZA+ uses a simplified model for treating combinations of sound sources. Elements within an individual line array or column are always summed in a complex manner, which means that full signal coherence is assumed. This may overestimate pressure summation and cancellation effects among elements of the array, especially for very tall systems and windy environments. But it has turned out to be a good approximation in practice.

The summation between different line arrays, subwoofers, and loudspeakers/columns is by default calculated using power summation (based on a random-phase assumption) for the mid and high frequencies and complex summation for the low frequencies (assuming full coherence). This may underestimate the level of coherence among several line arrays in the mid-frequency range when they have the same configuration and are placed very close to each other. Nevertheless, for most practical setups this hybrid approximation is more feasible than either power summation or complex summation alone.

Absolute SPL calculations in CON:SEQUENZA+ assume a broadband excitation with a signal that is like program material. You can choose among three different types of input signal, page 43. Level values displayed in the mapping or in the frequency response are sum levels. This representation is equivalent to the readings one can take from real-time analysers (RTA) and sound level meters (SLM).

Note that in CON:SEQUENZA+ each sound source is always driven at its maximum input level. This means that if you assign a gain of -6 dB to each cabinet of the array, the output SPL will be unchanged. That is because the maximum input voltage is increased by 6 dB while the sensitivity of the system is decreased by 6 dB. The only exceptions from this are the Filter and Global Filter functions. They can be employed to adjust output levels of different arrays relative to each other. The current input voltage and the maximum input voltage for the selected line array system are shown in the status bar.

Be aware that the maximum input levels displayed in the software are only estimates based on the specification and an ideal input signal. Just like the SPL prediction for the receive location these results should be considered with care and are only accurate under the given limitations and uncertainties.

Please keep in mind that CON:SEQUENZA+ is just a tool implementing an acceptable compromise between ease-of-use, calculation speed and accuracy based on its main purpose of use.

## 4.3 Mapping Options

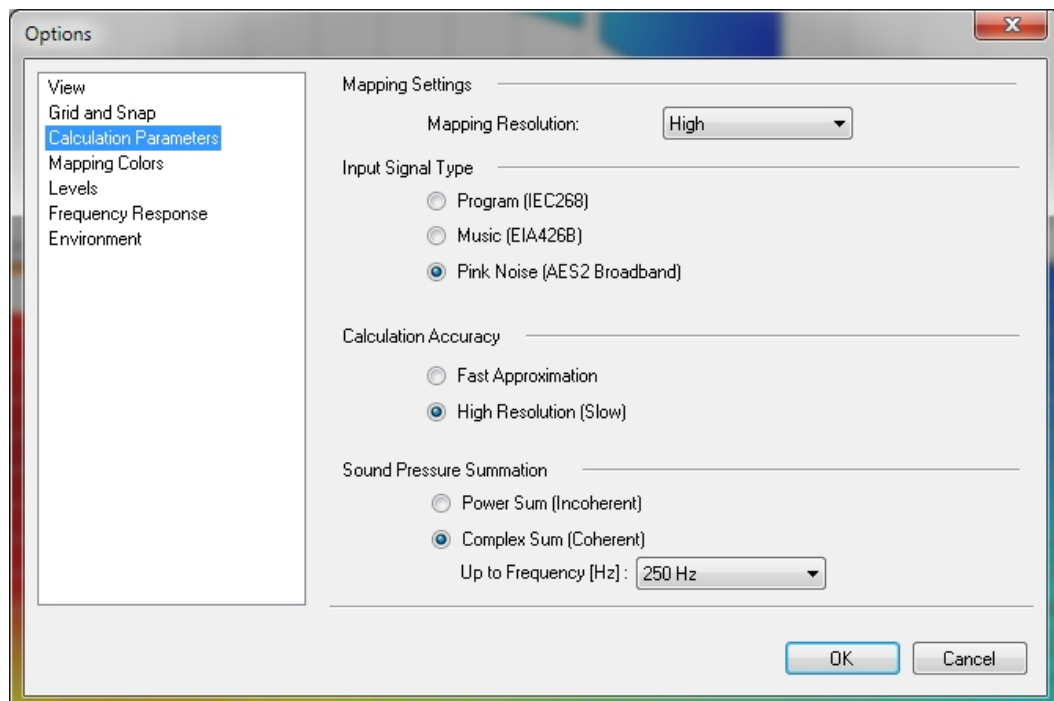
To access mapping options, select the menu 'FILE | OPTIONS' or hit [F9]. Then select the Calculation Parameters list item. Here you can choose the calculation resolution for your mappings: this will affect the patch size of your calculations. Note that the number of points to be calculated increases by about 10 times for every resolution level. Lower resolutions are computed first, and their result displayed while higher resolutions are being processed. You can click on the mapping progress bar located bottom right of Top View and Side View to read alternatively the remaining time until the current resolution is completed or the total time until calculations are finished.

The INPUT SIGNAL TYPE chooses the spectral content of the signal used to drive the input to all of the loudspeaker systems in CON:SEQUENZA+. The PROGRAM (IEC268) has the spectral content of the noise specified in the IEC 60268-5 standard. MUSIC (EIA426B) has the spectral content of the noise specified in the EIA 426-B standard. Both of these have less energy at the higher frequency regions (above approximately 1 kHz). The Program (IEC268) also has slightly lower energy at frequencies below about 100 Hz. Both of these selections can be used to better determine the maximum SPL from loudspeaker systems as they more closely resemble the spectral content of program material (i.e. music or speech) than pink noise. The last selection, PINK NOISE (AES2 BROADBAND), is simply pink noise. This is a good choice when checking the frequency response of loudspeaker systems in CON:SEQUENZA+.

The SOUND PRESSURE SUMMATION selection only affects the summation between different sound sources in CON:SEQUENZA+ (i.e. individual instances of GLLs). This setting can be used to control the type of summation used between different instances of line arrays, between different instances of loudspeakers, and between different instances of line arrays and loudspeakers. This makes it possible to build discrete arrays using multiple instances of a loudspeaker. One such application would be building manually configured subwoofer arrays by manually arranging individual boxes.

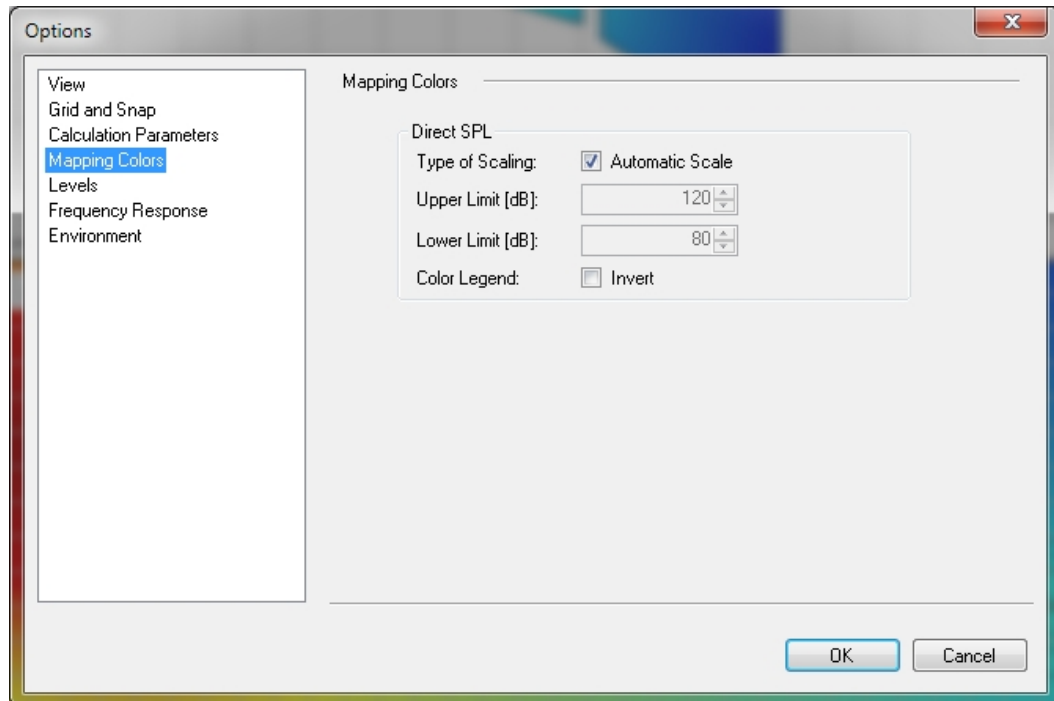
When POWER SUM (INCOHERENT) is selected the summation between different sources will be calculated using a power summation which disregards phase information and relative propagation delay. This is the calculation method used in versions of CON:SEQUENZA+ prior to Version 3.0.

When COMPLEX SUM (COHERENT) is selected an additional parameter also needs to be chosen. This is the frequency up to which complex summation is used. Below this frequency complex summation is used. Above this frequency power summation is used. It should be noted that there is not an abrupt change in the type of calculation used at this frequency. Rather, there is a smooth transition from complex summation to power summation that occurs. This transition takes place over a one octave interval. As an example, for an UP TO FREQUENCY of 1 kHz, the transition from complex to power summation starts one-half octave below 1 kHz (707 Hz) and ends one-half octave above 1 kHz (1.41 kHz). At 1 kHz the summation is 50% complex and 50% power. This balance smoothly changes over the one octave transition bandwidth. In reality, the transition from coherent to incoherent does not only happen as a function of frequency but also as a function of the propagation distance to the receiver and of the relative distance between considered sources and will depend on environmental conditions. These effects are not accounted for in CON:SEQUENZA+.



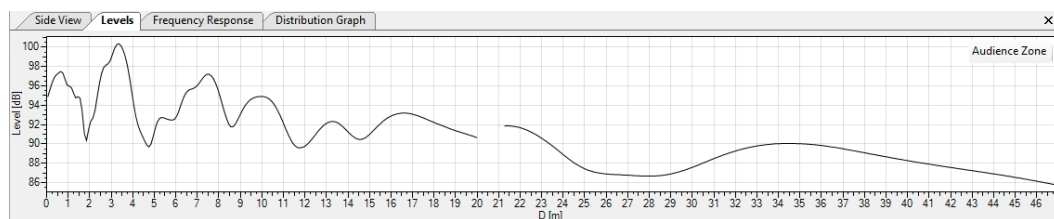
If you select the Mapping Colors page, you will be able to choose between an automatic color scale (default) or a scale constrained between values that you define. You can do this separately for SPL and Signal-to-Noise mappings, and you can even choose to invert the scale with respect to default colors.

You can also access this option page directly by clicking on the mapping scale on the right side of the Top View or of the Side View.

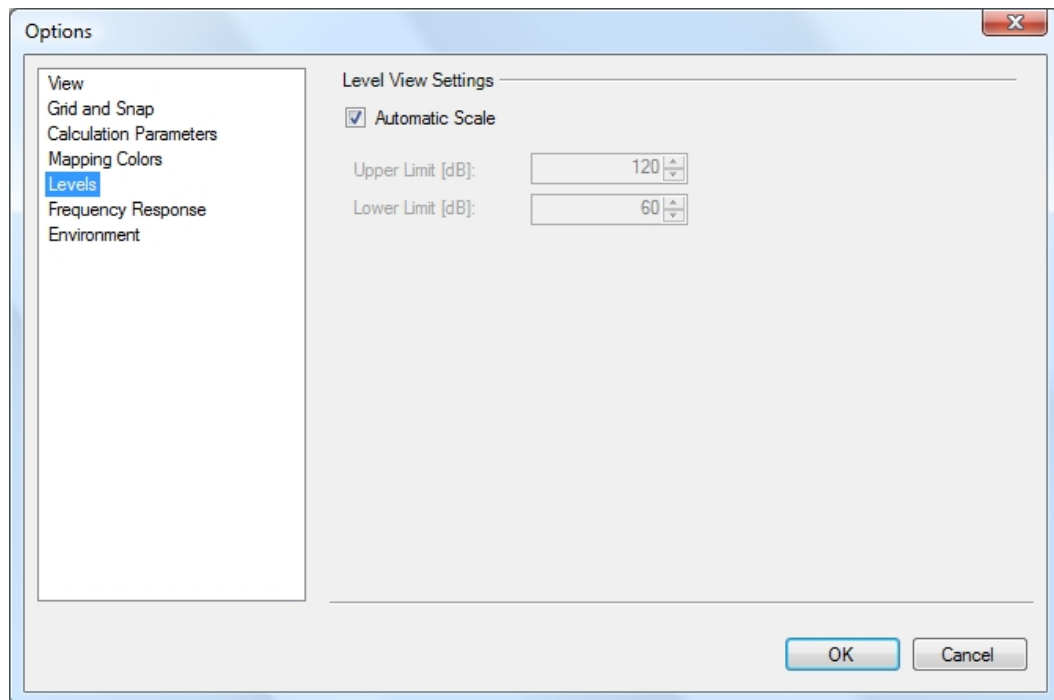


## 4.4 Level

If you need to check accurate level readings along one direction, you can use the Levels window for that. It will consider exactly the same section that is used for the display in Side View, and show all level lines on Audience Areas that intersect with it. If an Audience Zone is selected (or locked in Side View), its Audience Areas are cut along the median axis; for Sound Sources, all Areas that intersect with the aiming axis will be shown. The same holds for Receivers (page 46) and Section Planes (page 59). Note that this information is also visible in Side View, only you do not have the Z coordinate in the Levels window, but rather a dB scale, so you can have a more accurate idea on how to interpret level lines.



Clicking on the dB scale on the left will directly open the Levels page in the Option window. An alternative to that is selecting 'FILE | OPTION' or hitting F9 and then opening the Levels page manually. You can choose here to have an automatic scale (default) or define a manual scale.

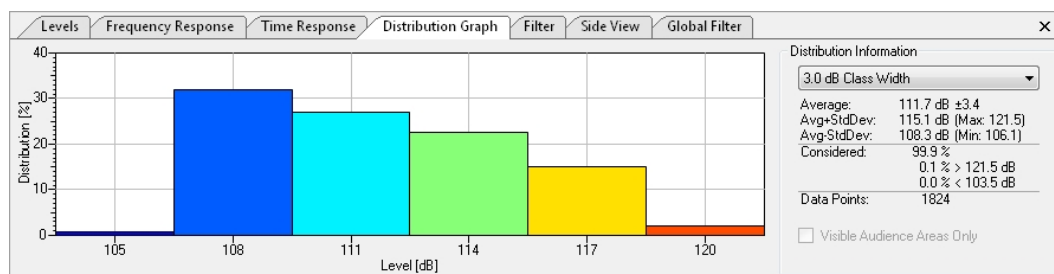


## 4.5 Distribution Graph


When mapping is active, the Distribution Graph window is available as a tool to check the acoustic coverage on your project. You can view statistics on pressure levels over all mapped points, and see a bar chart that summarizes all results. The width of the bars can be adjusted. Displayed are the average SPL or S/N value, the standard deviation, information on which percentage of all calculation points has been included in the graph and the total number of points.

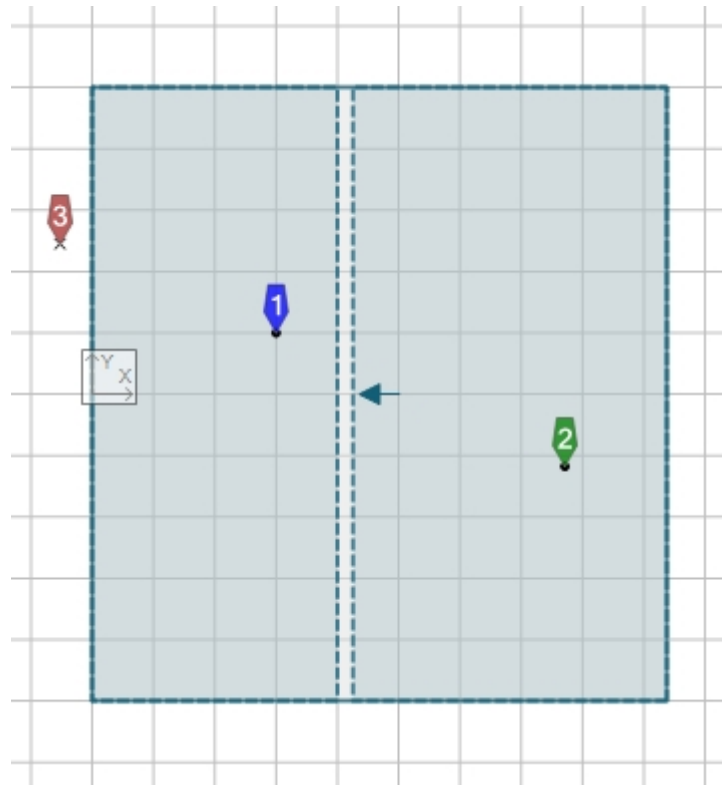
The distribution function is especially powerful to optimize the uniformity of SPL coverage and S/N. Select a class width of 3 dB or 6 dB to see the percentage of all mapping points within that range relative to the average. Typically, system designs try to optimize coverage in a way that, for example, 90% of the audience is within a range of  $\pm 6$  dB.

There is another option that you can check: 'Visible Audience Areas Only' which will exclude invisible Areas from the statistics computed.



## 4.6 Adding Receivers

To add a Receiver, use this icon and then simply click on the location where you would like to place it, or click and drag to adjust its viewing orientation. There are mainly two types of Receivers: anchored and unanchored (free). Anchored receivers are bound to a specific Audience Area, and move along with it; free Receivers preserve their original position independently of all other objects in the project. Anchored Receivers can be recognized from a dot on their bottom end, free Receivers from a cross. 

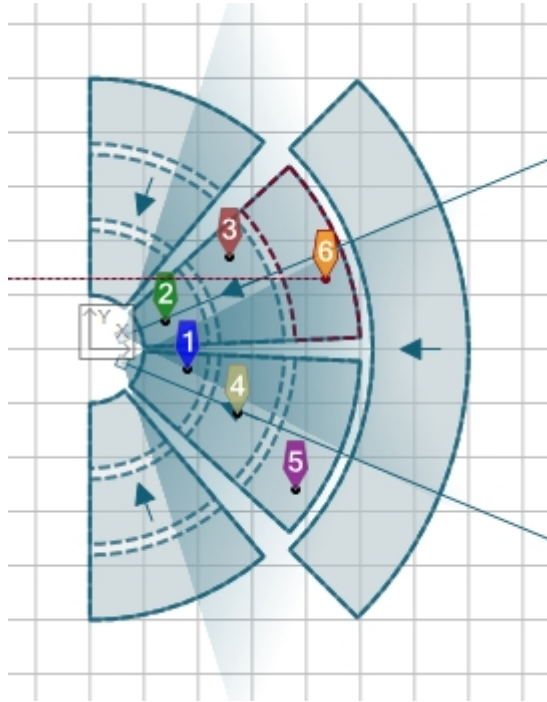


Receivers can be added both in the Top View and in the Side View, by just clicking (or dragging in Top View) after you select the toolbar button. A Receiver added or moved inside an Audience Area will be automatically anchored to that Area, and its height will be the corresponding audience ear height at that point. To add or move a free Receiver over an Audience Area, hold the Ctrl key while performing the operation with your mouse.

Object Properties			
Receiver 3			
X [m]:	<input type="text" value="2.61"/>	Orientation [°]:	<input type="text" value="180.00"/>
Y [m]:	<input type="text" value="12.25"/>		
Z [m]:	<input type="text" value="0.00"/>	<input type="button" value="Anchored"/>	

As seen for other objects, you can edit the properties of a Receiver in the Object Properties window (if it is not visible already, select the Receiver and choose 'VIEW | PROPERTIES', or alternatively right click on it in the Top View and select 'Properties', or just hit F4). The properties of a Receiver consist primarily of its coordinates. You can also toggle the Anchored property, or define its orientation (corresponding to the aiming line shown in Top View): this will determine what will be displayed in the Side View when this Receiver is selected.





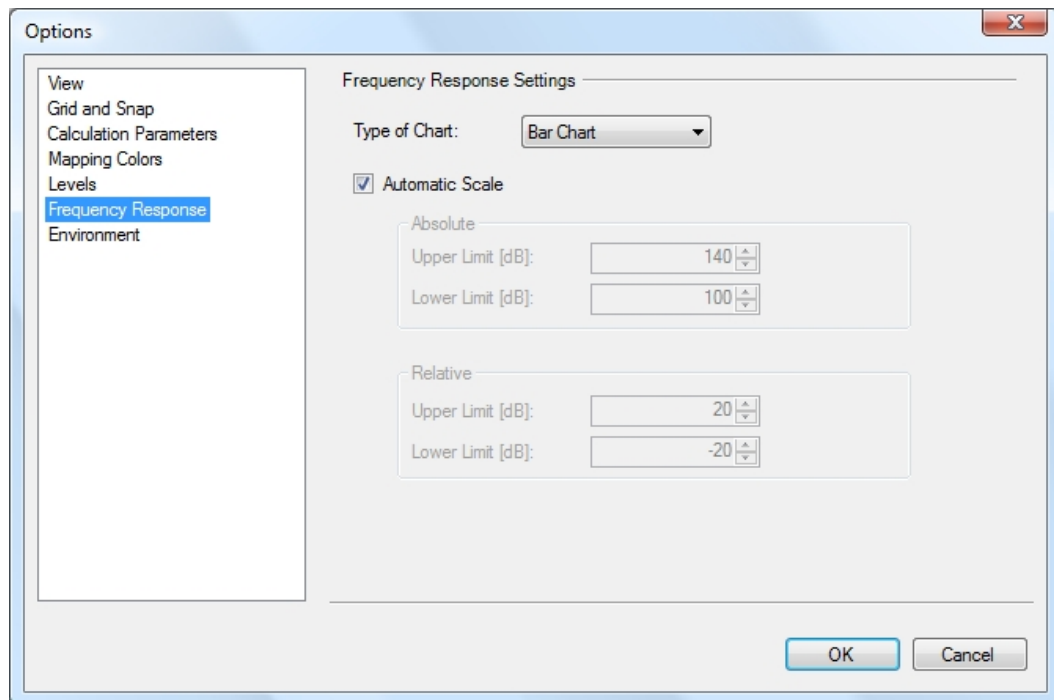
Tip

Add a Receiver to each of the Audience Areas of your "Floor Middle Left" and "Floor Middle Right" Audience Zones (the ones you pointed your line arrays towards). Place them at representative positions.

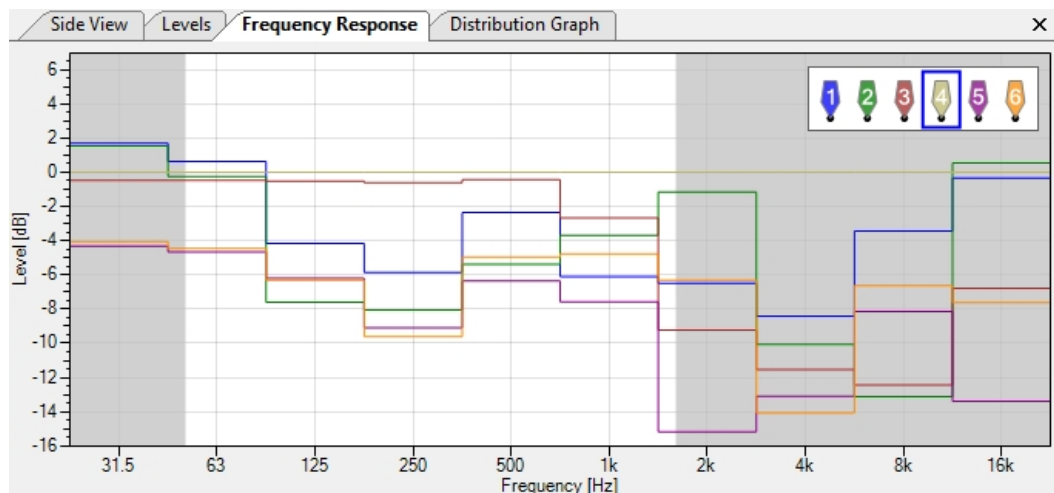
## 4.7 Frequency Response

The response at Receiver points can be monitored with the Frequency Response window. The type of graph (Direct SPL, A-Weighted, S/N Ratio) reflects the settings in the Mapping toolbar. The resolution will be one octave, unless you selected a mapping resolution of 1/3 octave (available in the Extended mode, page 56). You can use the legend in the top right of the Frequency Response window to show or hide plots for specific receivers (by right-clicking on their symbols) or to display relative values to a specific Receiver (by left-clicking on the Receiver that you want to use as a reference).



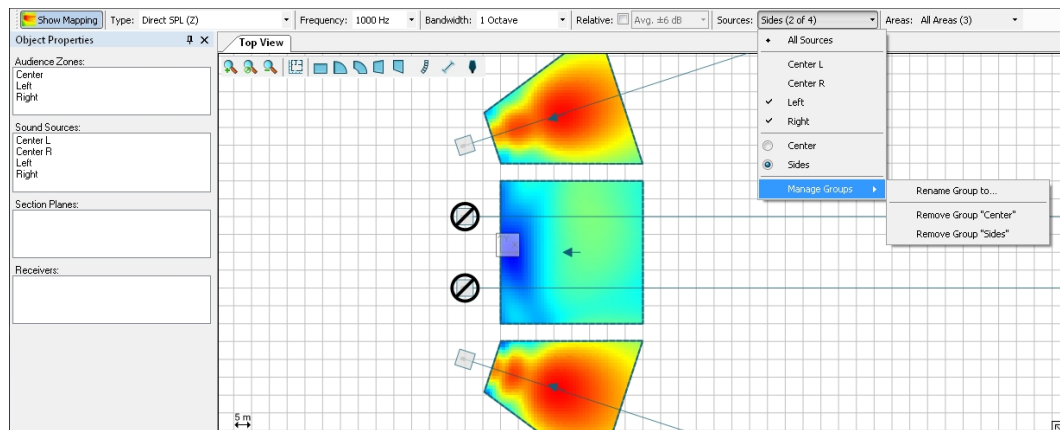


Clicking on the dB scale on the left will directly open the Frequency Response page in the Option window. Alternatively you can select 'FILE | OPTION' or press F9 and then open the Frequency Response page manually. Here you can choose between displaying an automatic scale or defining a manual scale, both for the absolute and for the relative plot.

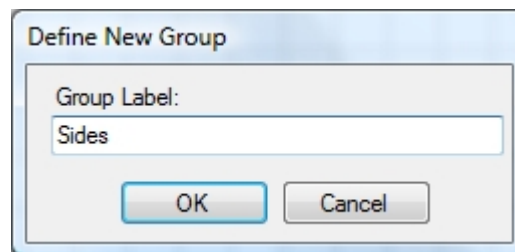


## 4.8 Sound Source Groups

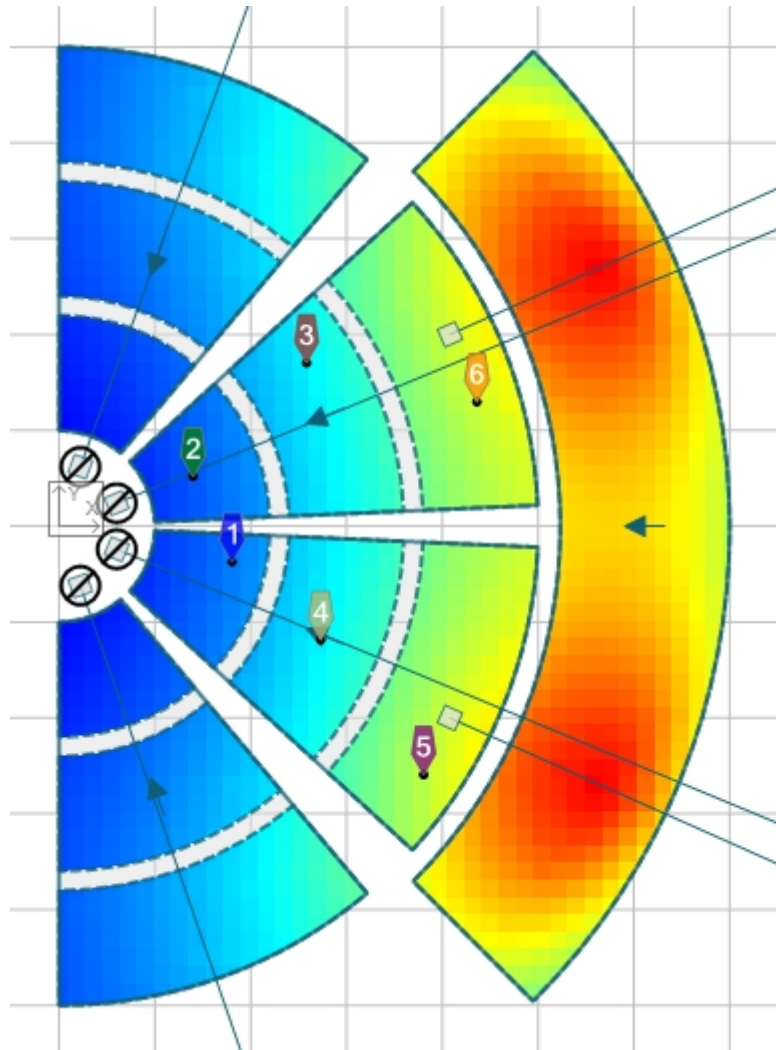
When working on complex projects, you may often want to optimize smaller audience portions and single systems separately. If you find yourself in this situation, you will appreciate CON:SEQUENZA+ ability to toggle every single Sound Source in your project. This can be done in the Mapping Toolbar: here you find a dropdown menu after the label Sources, listing all Sound sources in the project. The default text will be All Sources followed by the number of Sources in your project. To switch a Source off, click on the menu and select its name from the list. The Source that you turned off will display a black icon as shown in the figure below. If you want to switch a Source on when it is turned off, just perform the same operation again. You can switch all Sources on or off at any time by clicking on 'All Sources' on top of the menu.



If you need to constantly switch between different source on/off combinations in your project, you want to avoid doing this operation every time: you need Sound Source groups for that. Switch all Sources off except the ones that you want to include in your group. Then, still in the Sources menu in the Mapping Toolbar, select 'MANAGE GROUPS | STORE CURRENT SELECTION AS A GROUP'. You will be asked to enter a name for your new group.



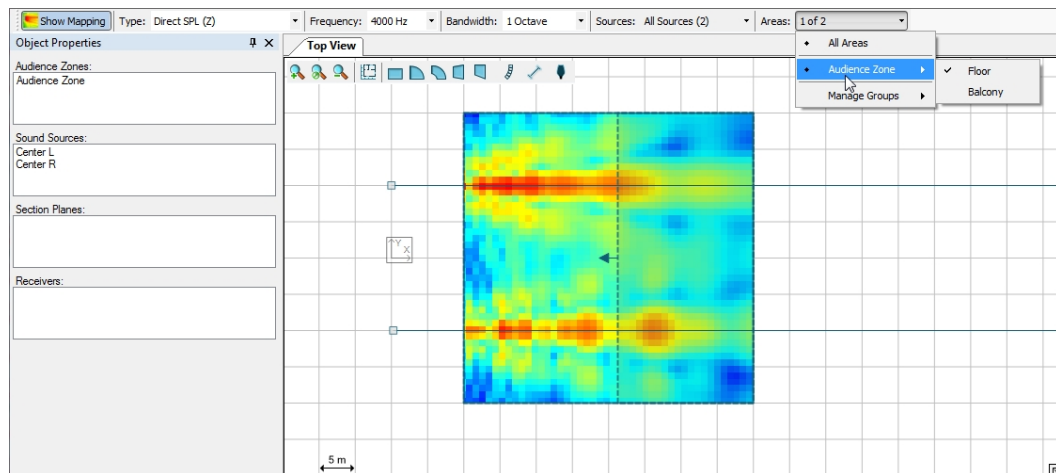
You can then recall a group at any time from the Sources menu. When a group is active, you can also rename it or delete it from the submenu Manage Groups.



Place two Line Arrays in front of "Left" and "Right" Audience Zones (page 26), for the middle Zones, and two for the balcony (see figure). Configure all new Sources. Then create a group for floor Line Arrays and a group for balcony Line Arrays.

## 4.9 Audience Area Groups

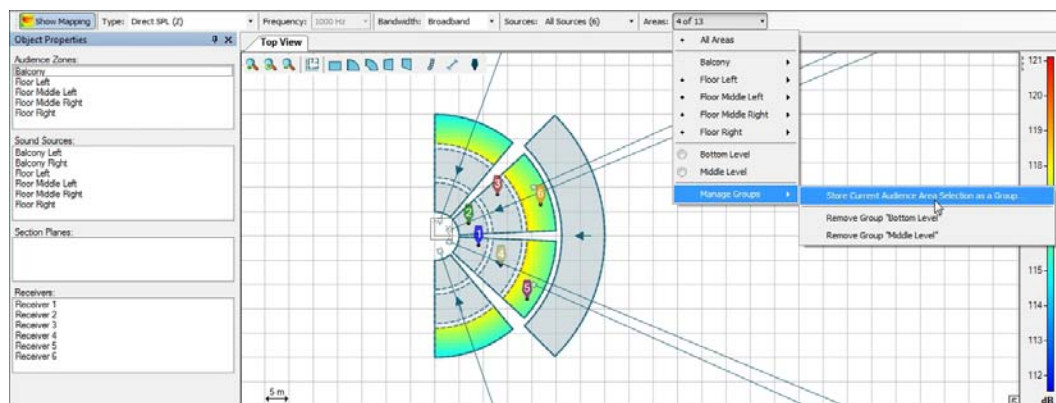
As explained for Sound Sources in the previous paragraph, Audience Areas can also be hidden from the mapping. This is especially useful when two Areas are partly overlapping, and one is hiding the other one's mapping. Toggling mapping for Areas works just like for Sources: In the Areas menu in the Mapping Toolbar, you can see a list of all Audience Areas divided by Audience Zone, and turn single Areas or whole Zones on and off.



For Audience Areas you can also create groups, as already described for Sound Sources: switch on all the Areas you want to include, and select 'MANAGE GROUPS | STORE CURRENT SELECTION AS A GROUP'. You can then use the submenu Manage Groups to rename it or delete it.

Note that you can create or edit Audience Area groups when copying Audience Areas between Zones as well (page 23). If you want to do so, you need to perform this operation from the Copy Areas button in the Object Properties window of your Audience Zone. Here you can pick one of two options: Create New Groups will make from scratch a new group for every Audience Area to be copied, including the original Area and all its copies across all Zones. If you already have one or more groups including some of the areas that you want to copy instead, and you want to include their copies in the same groups, you need to check Extend Existing Groups. You can even choose which specific groups you want to extend.

Please note that the Distribution Graph (page 46) will continue to include hidden Audience Areas in its statistics. This can be changed by checking the box Visible Audience Areas Only under the statistics.



Tip

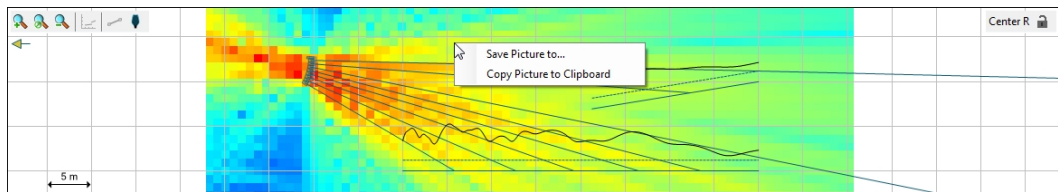
Create an Area group for every level of your amphitheater. Do this by selecting all areas one by one first.

You could have done this quicker when you copied your Audience Areas to all floor Zones of your project. If you want to try this, delete the groups you just created. Then select one of the Zones and perform the Copy Areas operation again, from the Copy Areas button in the Object Properties window. Select all other Zones, expand the Audience Area Groups panel and check Create New Groups, then click OK.

## 4.10 Exporting Pictures

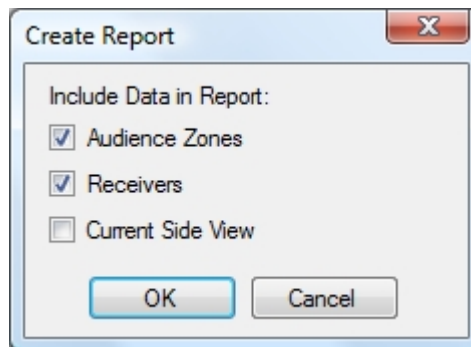
Once you finish working on your project and you are satisfied with the results you have obtained, you can show them to the people you are working with or take them to the venue. One simple way to do this is by exporting pictures from windows. All CON:SEQUENZA+ windows that display pictures, maps or plots are able to export them to files as well: to do that, use the menu item File | Export Picture. This will open a submenu with a list of all available windows: those which cannot export a valid picture are greyed out, the others are enabled. If you select one of the enabled items, a dialog will appear asking where you want to save the picture and offering different formats to choose from. Once the picture has been saved, it will be opened automatically with your default program.

Another way to export pictures is by right-clicking on them. This will open a popup menu with two options. Choosing Save Picture to... will save it to a file, equivalently to the procedure described above. Selecting Copy Picture to Clipboard will store it in the Windows clipboard, so you can paste it in any software program that supports it.



## 4.11 Creating Reports

The easiest way to generate an overview of your project, however, is the report feature. This can be accessed by selecting File | Create Report. A small window will be displayed asking which details you want to include in the report; then you will be asked for the location where you want to save it and which format you want to use: you can choose between PDF, which will produce a file readable with Adobe Reader or similar software and ready to print, and RTF, which you can edit with Microsoft Word or other word processors. The result is a document containing all the details from CON:SEQUENZA+ that you need to install your K&F sound system at the event location.



Tip

Congratulations! You now have sufficient knowledge to take full advantage of CON:SEQUENZA+ for your projects. You can still play around with your amphitheatre project, for example adding more receivers, trying to tune your line arrays or to displace them, and generating pictures and reports. If you want to discover the advanced features in CON:SEQUENZA+, you can go to chapter 6 and start with a new project. But first we suggest that you read chapter 5 to learn more about the options available in CON:SEQUENZA+.

## 5. Options

In this chapter we will briefly examine the Options window. You can open it from the menu 'FILE | OPTIONS' or by hitting F9.

In the previous chapter we have already discussed the option pages for Calculation Parameters and Mapping Colors (page 43), Levels (page ) and Frequency Response (page 48). The Time Response page, available in the Extended mode (page 56), will be discussed in page 63.

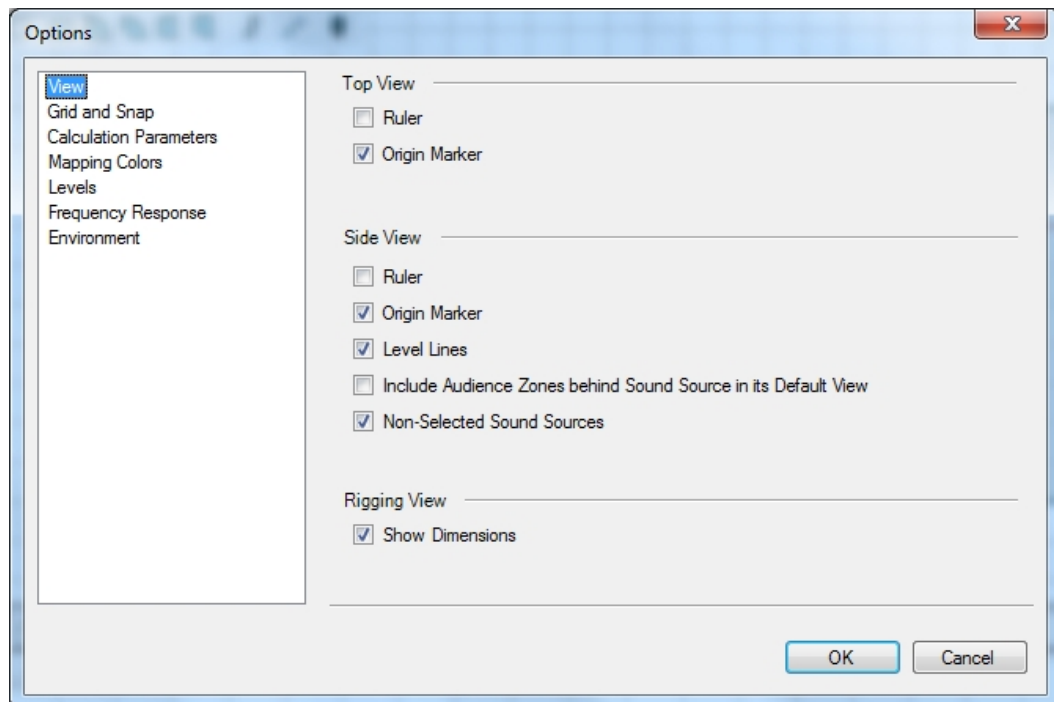
Therefore, here we will only go into the remaining pages: View (page 12), Grid and Snap (page 54), and Environment (page 55).

## 5.1 View

In the View page you can switch on and off some elements that can be displayed in the Top View, Side View and Rigging windows.

Both Top View and Side View can show rulers for both axes and an origin marker at the point {0, 0}. For the Side View you can also toggle level lines on Audience Zones; in addition, you can choose to always display the 3D case of a Sound Source in the background even when another object is selected. Leaving the option Include Audience Zones behind Sound Source in its Default View unchecked will display the selected Sound Source always on the left edge of the Side View, along with all elements in front of it; checking it will show objects behind it as well, if some exist.

Finally you can choose to show or hide the total dimensions of sound sources in the Rigging window.

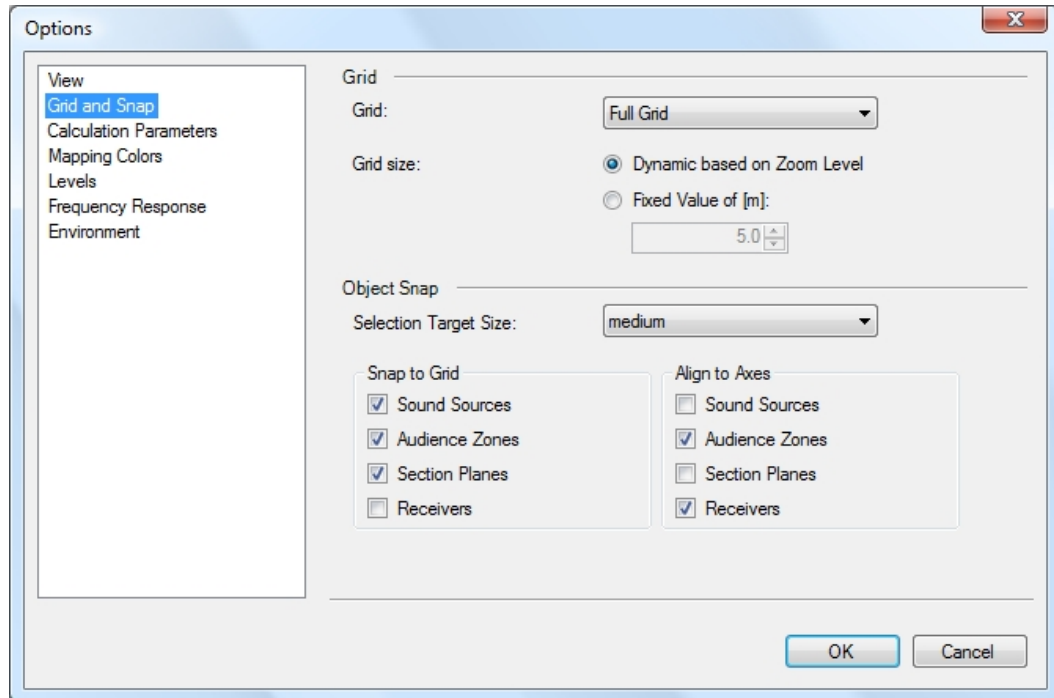


## 5.2 Grid and Snap

The Grid and Snap page displays options related to the grid, shown in both Top View and Side View, and to the behaviour of the user interface when moving or editing objects.

There are two types of grids in CON:SEQUENZA+: Full Grid shows a normal grid, as is in the default settings, whereas Points Only displays only crossing points between grid lines, but not the lines themselves. Alternatively, the grid can be completely deactivated by choosing No Grid. If a grid is visible, its size can be automatic (based on the zoom level) or manual (a fixed value entered by the user).

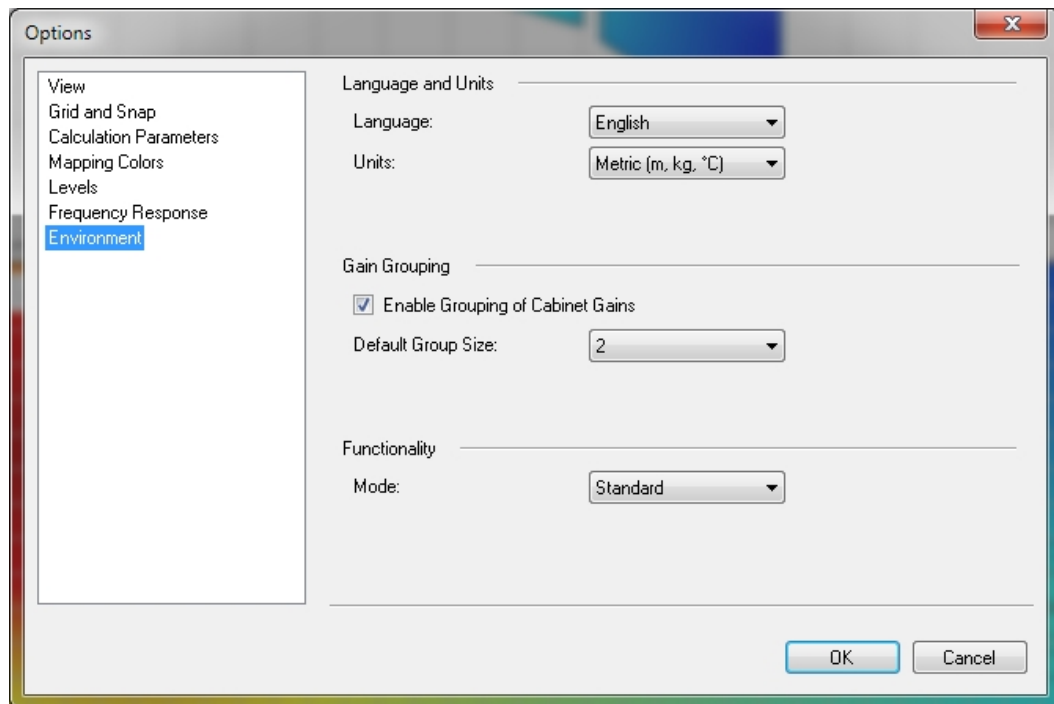
Snapping happens in two ways when the grid is active: Snap to Grid refers to all those actions where an object is being moved or resized, and the object or its edges automatically snap to grid lines when they are close enough; Align to Axes happens whenever an object is being rotated, and its edges snap to the vertical, horizontal or 45° diagonal axes. Both behaviours can be toggled for all types of objects, and their sensitivity can be set with the Selection Target Size dropdown menu.



### 5.3 Environment

The Environment page lets you choose the language of CON:SEQUENZA+ (which also affects reports that you produce, §4.11) and the measurement units (meters or feet).

Here you can also switch between Standard and Extended mode. Extended mode enables some features that you may need when working on complex projects, such as Time Response (page 63), Signal to Noise Mappings (page 65), Filters and Global Filter (page 62).



## 6. Advanced Features

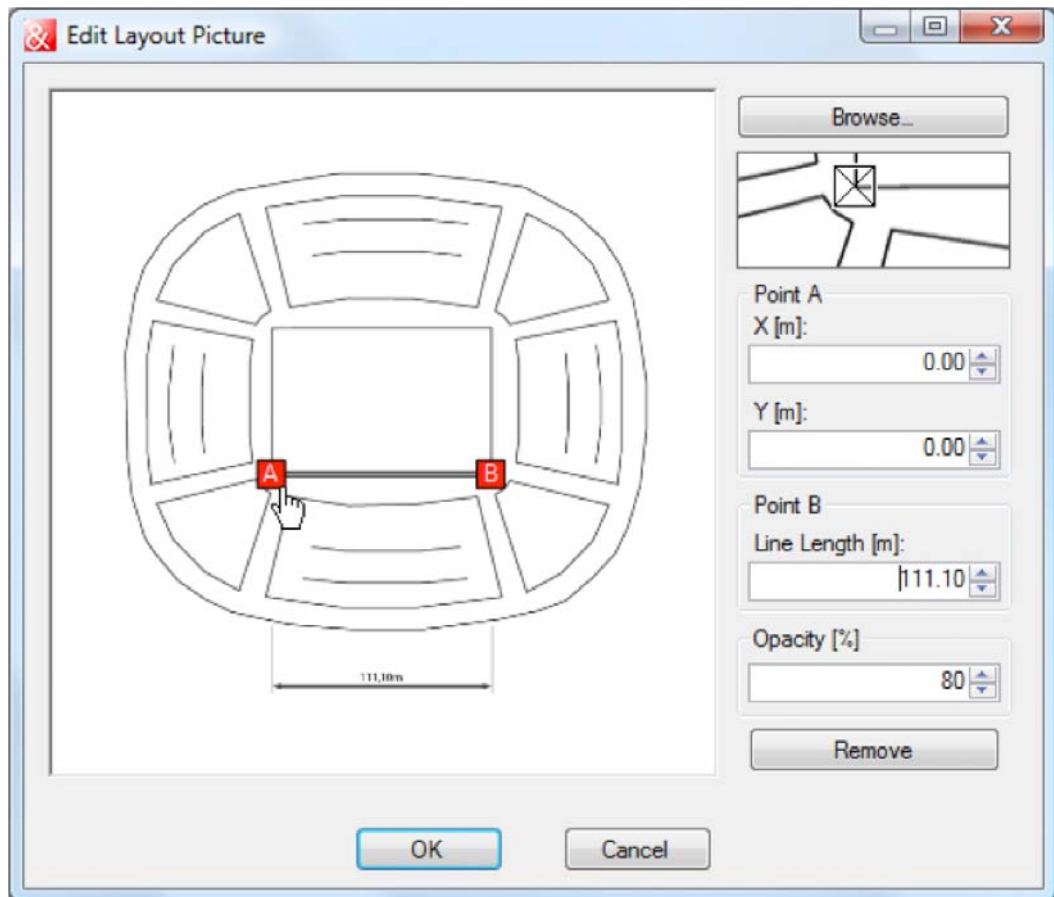
This chapter goes into some features of CON:SEQUENZA+ that can be used to take full advantage of its capabilities.

### 6.1 Setting Layout Pictures

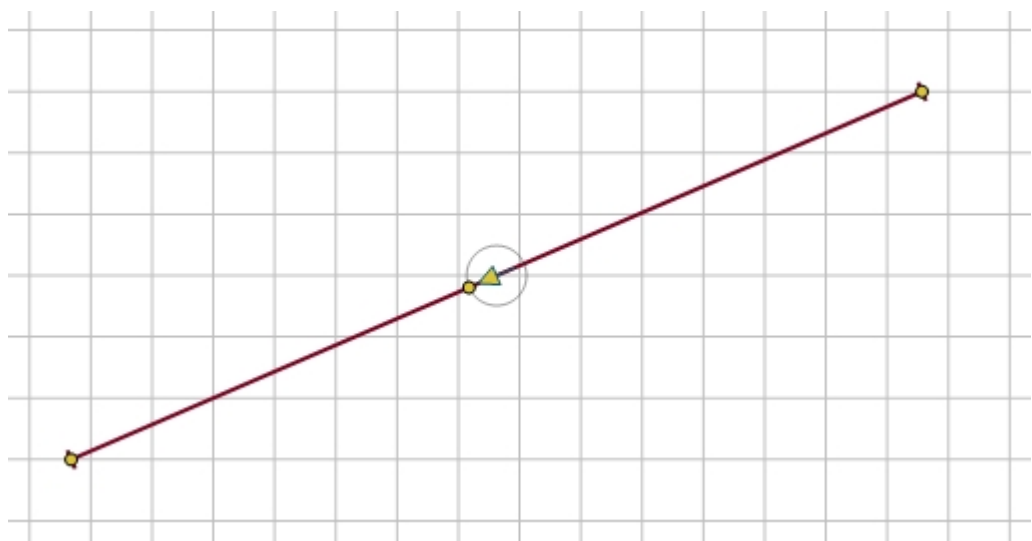
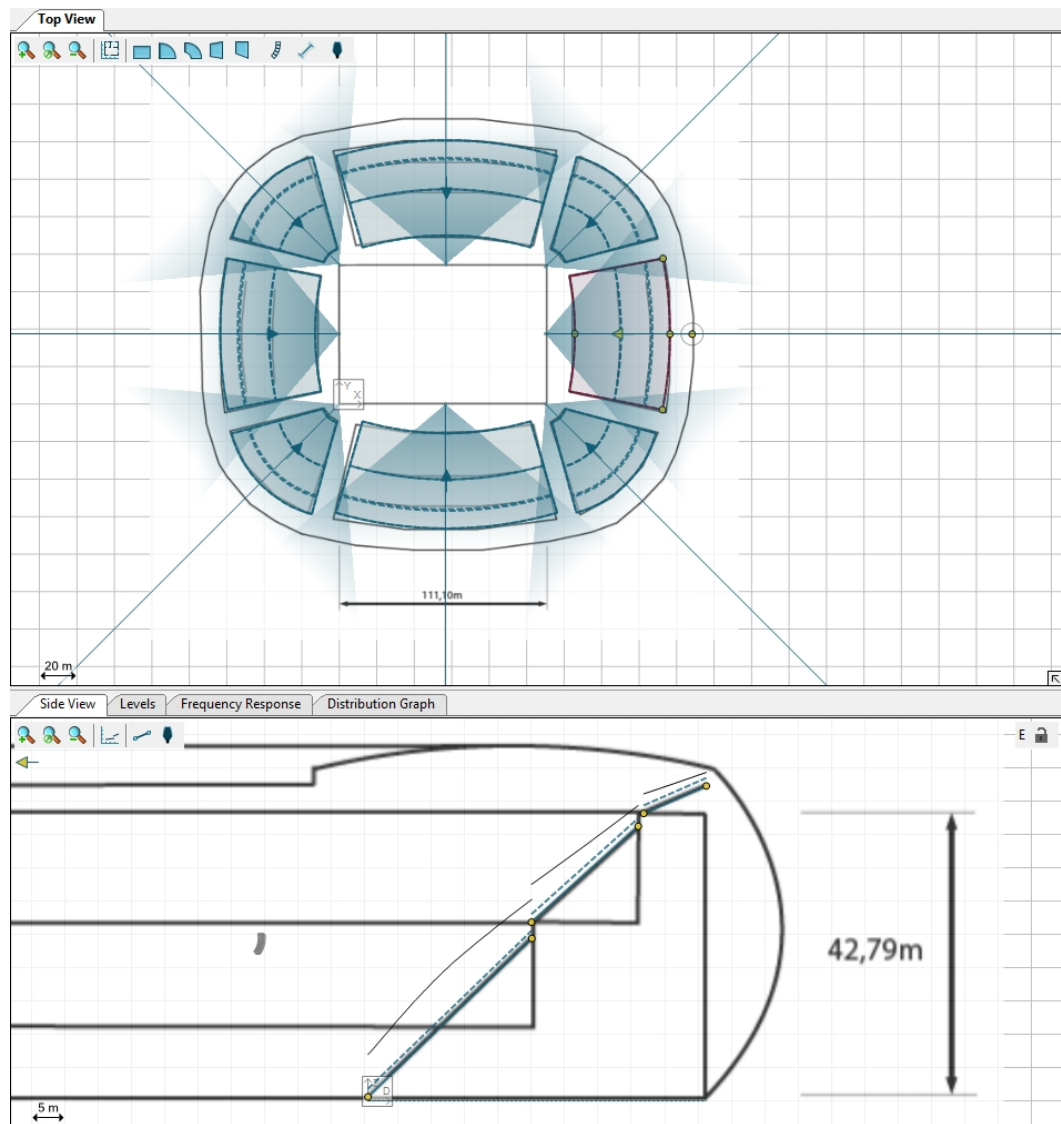
Sometimes you may happen to have a plan drawing or an aerial picture available for your venue. In this case you want to use the picture as a basis to draw your project on.

Click on the Layout Picture icon : a window will appear, and you will be asked for a path to load your picture from. Once you have imported the picture, you will need to drag the points A and B until they match an edge on the drawing whose length is known. Then enter the length; you can also define the shift of the image, by entering the XY-location of point A in your project, or set the opacity of the picture. When you click OK, you will be able to see the picture in Top View, and to draw your venue on top of it.





The same is possible for the Side View: in this case you can load one layout picture for each Audience Zone, by clicking on the icon in Side View when the zone is selected. If you have a cross-section drawing of your venue, you can use it for that. In this case, you will be able to define DZ-coordinates for point A (relative to the front edge of the zone, along its central axis).





Tip

Go to the main program directory of CON:SEQUENZA+: normally this is "C:\Program Files\KLINGFREITAG\CON:SEQUENZA+" (on 32 bit systems) or "C:\Program Files (x86)\KLINGFREITAG\CON:SEQUENZA+" (on 64 bit systems), unless you entered a custom path at setup time (page 5). Use the files that you find in the "Tutorial" subdirectory as layout pictures for a new stadium project: 'stadium\_topview.png' for the Top View, 'stadium\_sideview\_long.png' and 'stadium\_sideview\_short.png' for the Side View in the two dimensions. Draw Audience Zones and Areas based on it, and place Line Arrays as shown in the picture.

## 6.2 Adding Section Planes

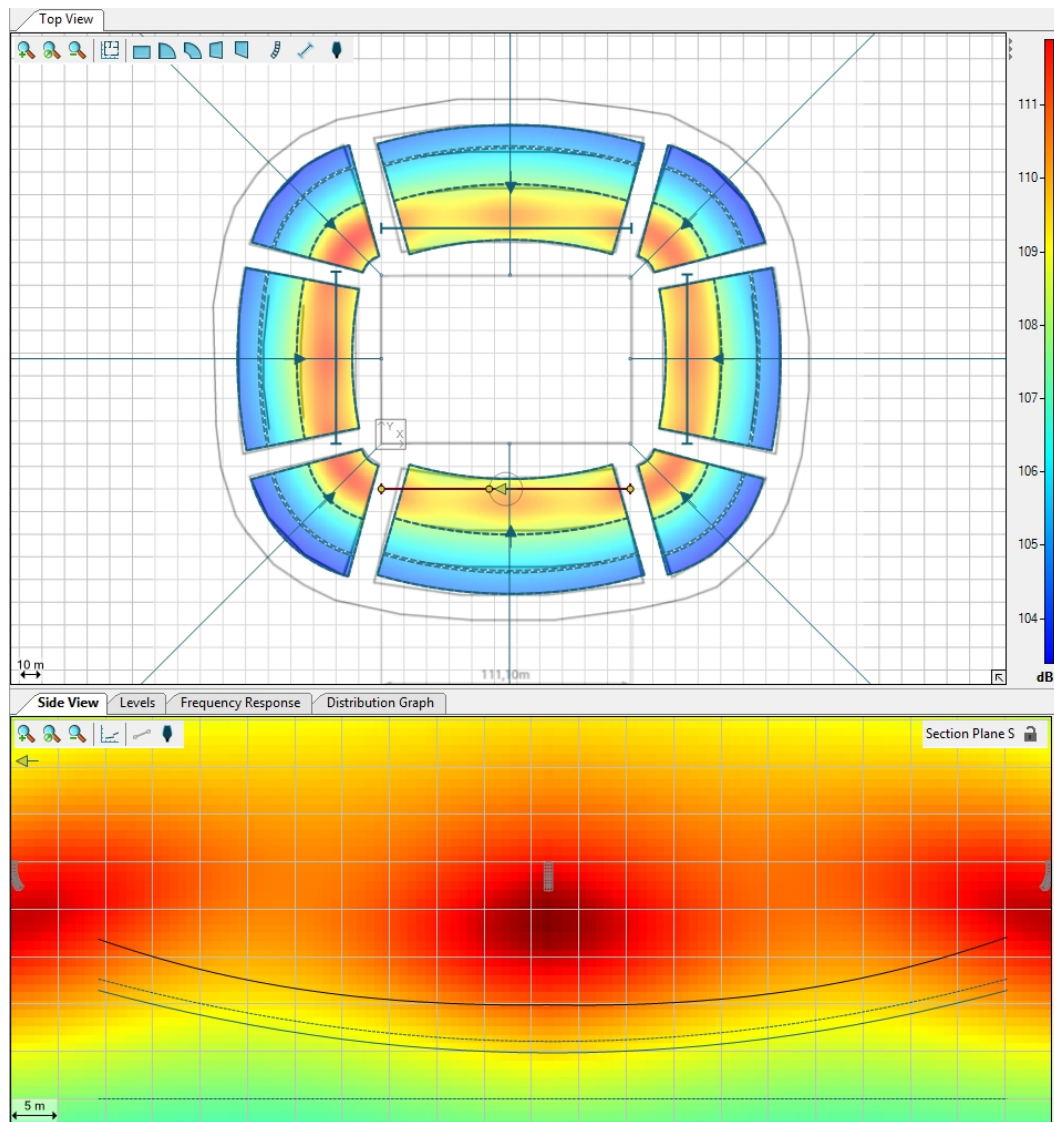
Section Planes, just like other objects, can be added by clicking on the associated toolbar button and then clicking or dragging in the Top View.

Section Planes are objects that don't have a physical or acoustical meaning: they are only used for viewing purposes. When a Section Plane is selected, the Side View shows the corresponding section: this allows examining, for example, mappings or level lines along axes that do not relate to any other object in the project.

The starting point of the Section Plane is shown on the left in its Side View, and the end point is on the right; the default view (obtained by clicking on the Scale to Fit button in Side View) is exactly comprised between these two points, even if this may cut other elements out of the displayed section. The arrow drawn along the selected plane in Top View, just like for Audience Zones, relates to the identical arrow in Side View pointing to the left: therefore it is pointing from the end point to the starting point in Top View; the viewing perspective can be flipped by rotating the arrow, dragging the mouse handle next to its tip.

Like all other objects, Section Planes have a related Object Properties window (accessible by selecting View | Object Properties in the main menu, or right clicking on the Plane and selecting Properties, or hitting F4). Here you can view and edit the edge points, the length and the angle of the Section Plane.

	X [m]	Y [m]
Front:	38.40	-10.00
Back:	107.84	20.00
Length [m]:	75.65	
Angle [°]:	23.36	

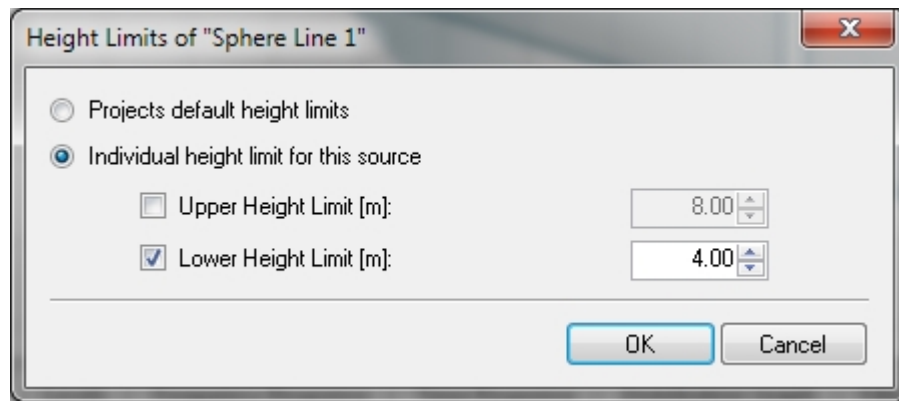


Add transversal Section Planes to your project, as shown in the figure above. How do SPL values vary across the circles?

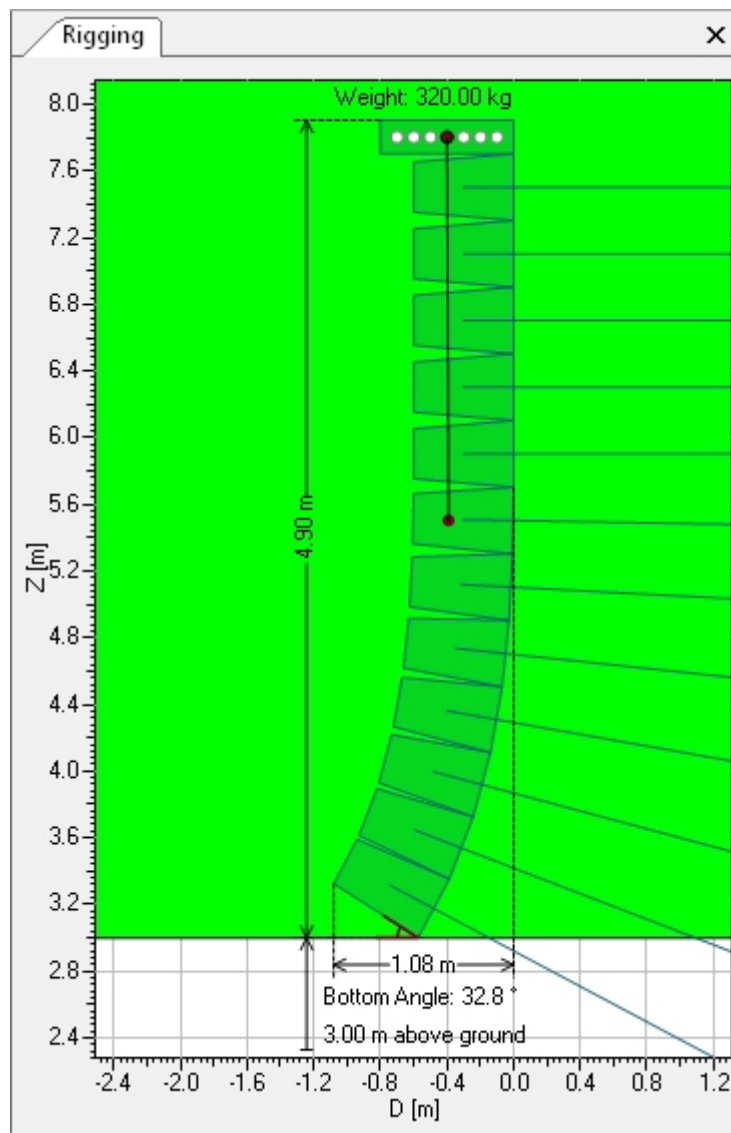
### 6.3 Mounting Height Based on the Lowest Point of System

The mounting height of a system can be mostly defined on its properties tab, by changing the Z field value. In the case of a line array, this height is typically referenced to a point on the top of the array frame (i.e. fly bar). For conventional loudspeakers, the reference may be the center of geometry, or the cabinet top / bottom, depending on the manufacturer's preference when modeling the loudspeaker. There are some applications where defining the array height based on its lowest point is quite useful, however.

The sound source HEIGHT LIMITS allows this task to be performed in a quick, yet iterative, manner. In the properties tab for the sound source, specify the LOWER HEIGHT LIMIT to be allowed and click OK. The global lower limit for the project can also be specified, via the PROJECT SETTINGS window, available on the Project Properties tab.



With the sound source selected in the Top View, press the shortcut keys [Ctrl + L]. This will set the mounting height of the array so that the lowest point at the bottom of the array is at the specified lower height limit. This shortcut will always take the array to the lowest height possible, based on the lower height limit specified.



When working with a line array the splay angles may need to be adjusted after the array is relocated to the new height. The Auto-Splay routine can be used for that. Changing the splay angles might cause a slight change of the array's vertical size. This in turn causes the array lowest point to also be slightly shifted. If so, simply press [Ctrl + L] again to quickly set the system height to the lower height limit. The process of adjusting the array height and changing its splay angles might be iterative, but usually no more than 2 iterations are needed.

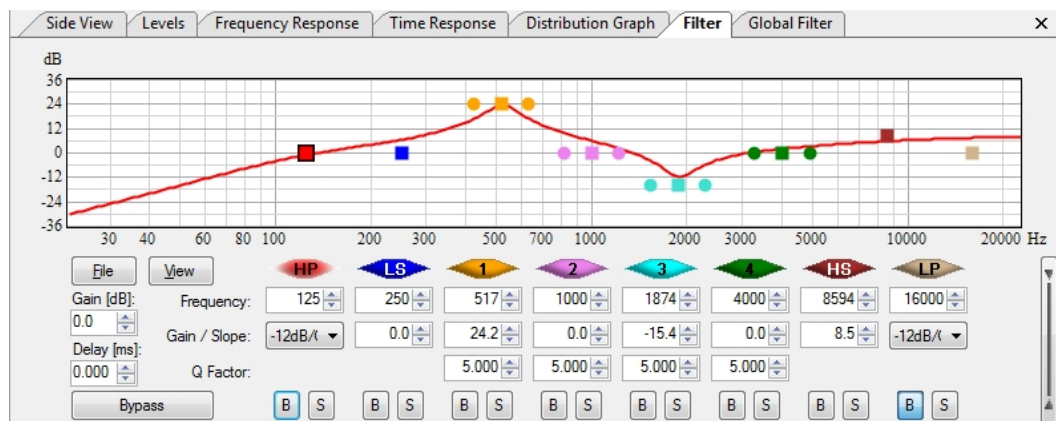
The rigging picture displays an example of a 12 element line array with its height adjusted according to the lower limit of 3 meters.

Note that the height adjustment can be analogously done using the Upper Height Limit. Pressing the shortcut keys [Ctrl + U] will take the system to the highest height possible.

If there is not a Height Limit defined for the source or the project, the corresponding shortcut will be inactive.

## 6.4 Filter and Global Filter

When a Sound Source is selected, a virtual filter can be applied to it: click on the Filter tab to see it (Extended mode only, page 56, on how to activate it). Eight individual filters are available, consisting of a high-pass filter, a low shelf, 4 peak/notch filters, a high shelf and a low pass filter.



Analogously to the Filter, the Global Filter is also only available in Extended mode (page 56 on how to activate it). The Global Filter looks identical to the Filter, except it is not applied to a single Sound Source, that is, a Line Array or Loudspeaker, but to all Line Arrays and Loudspeakers in the project.

Filters can be modified using the mouse handles in the plot or by editing filter parameters in the lower part of the screen (click on the double vertical arrow on the right to toggle the view of the parameter text boxes). Here you can also set gain and delay values for the Sound Source (or for all Sources, in the case of the Global Filter). You can bypass the entire filter bank (Bypass button on the left) or individual filters (B button below each filter); clicking on any of the S buttons you can also “solo” a particular filter and exclude all others.

Clicking on the View button you can edit graphical details of the plot. With the File button you can import a previously saved compatible filter or export the current filter to a Generic Filter Bank (.xgfb) file. You can also save only the transfer function of the filter, as an impulse response stored in one of many formats including .etm, .efr, Wave file and more.

Note that the color symbols located above the parameter fields are highlighted depending on which filter you are adjusting at the moment. Use a right mouse click on the filter symbol to reset the associated filter setting to its default.

## 6.5 Filter Settings for Line Arrays

Some line arrays will let you define filter settings for their sources. In most cases you can choose to have a single input for every box or even adjust multiple inputs for each box.

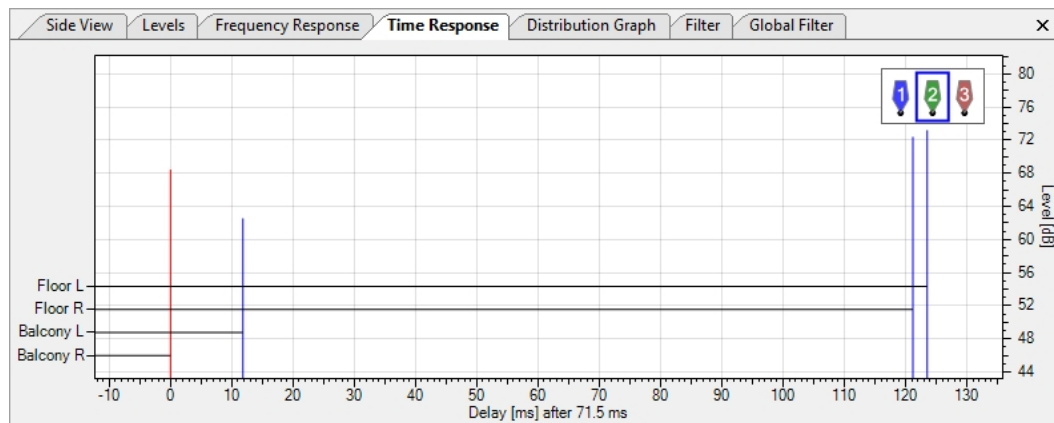
If a system definition lets you define filter settings, you will see it in the Object Properties window: just beneath the Position & Orientation frame, two buttons will appear: Rigging and Filter Settings. Clicking on them you can switch the view between rigging settings (available for all line arrays) and filter settings, where you can define input types exploiting configurations.

The difference between these filters and the Filter frame is that these are internal filters to the box, which are usually configured through an external controller, a DSP unit or a switch on the box, while the external Filter refers to an external device connected at the line array's input, such as a system DSP or an amplifier. The Global Filter usually represents a device located right after the mixing device in the signal chain, before the signal is sent to the different line arrays.

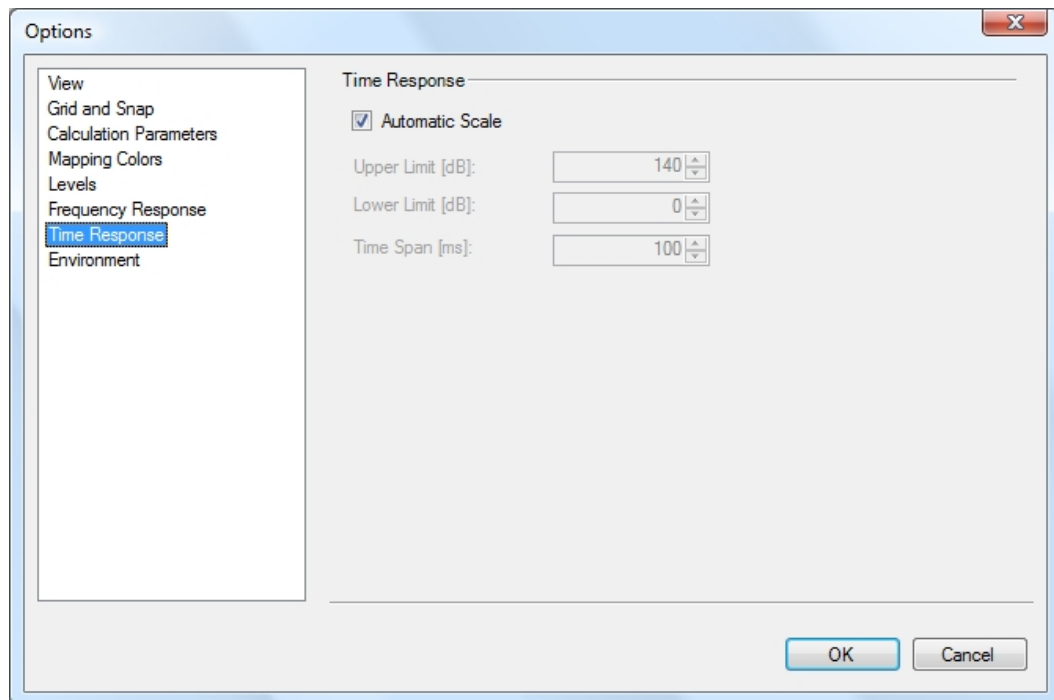
## 6.6 Time Response

For each Receiver, the time of arrival and direct SPL of every Sound Source can be viewed in the Time Response window (Extended mode only, page 56 on how to activate it). Click on a Receiver in the list in the top right of the Time Response window to see the plot for that Receiver. This view may be useful if you want to align delays for different Sound Sources. To set a delay for a specific Sound Source, select it and open the Filter window.

Just like in the real world, in the simulation domain the signal delay can also be optimal only for a single spot. When deriving delay values from the time response graph, make sure that you consider several listening locations which are representative of the whole audience area. Also note that the audibility of individual sources will depend on their arrival time and level relative to each other.



Clicking on the time scale or on the dB scale, you can access the Time Response page in the Options window (alternatively, you can reach it by selecting File | Options or hitting F9 and then selecting the item manually). Here you can choose between an automatic scale and a manual one, where you can pick the limits of the dB scale and the time span.



## 6.7 Exporting Line Array Configuration Data to EASE

Optimizing the mechanical and electronic configuration of a line array can be time-consuming. Particularly when considering room acoustic aspects or an in-depth analysis of the sound system design is needed, it will be interesting to simulate the sound system built in CON:SEQUENZA+ in EASE, as well. This process can be simplified by saving the configuration of a sound source in a GLL configuration file (\*.xlgc) and loading it in EASE.

- First select a Sound Source in CON:SEQUENZA+.
- Open the context menu using the right mouse button.
- From the menu, select SAVE CONFIGURATION FILE... in order to store the configuration data on your hard disk.

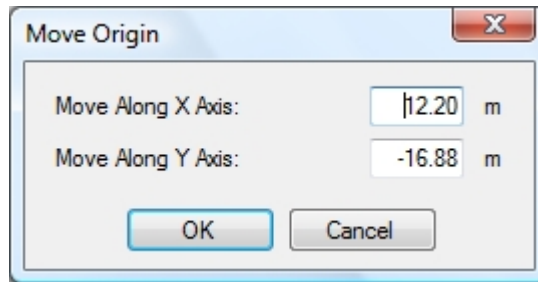
In EASE, you can load the same data using the IMPORT command in the GLL Configuration window.

## 6.8 Moving the Origin

If you have been working on your project for a while, and then would like to change your reference system without having to displace all objects inside it, you can move the origin instead. Just right click on the point where you would like to place it in the Top View, and select Move Origin Here: a window will appear, asking where you want to place the new origin exactly, and the default location will be the point where you clicked. Clicking OK will execute the change.

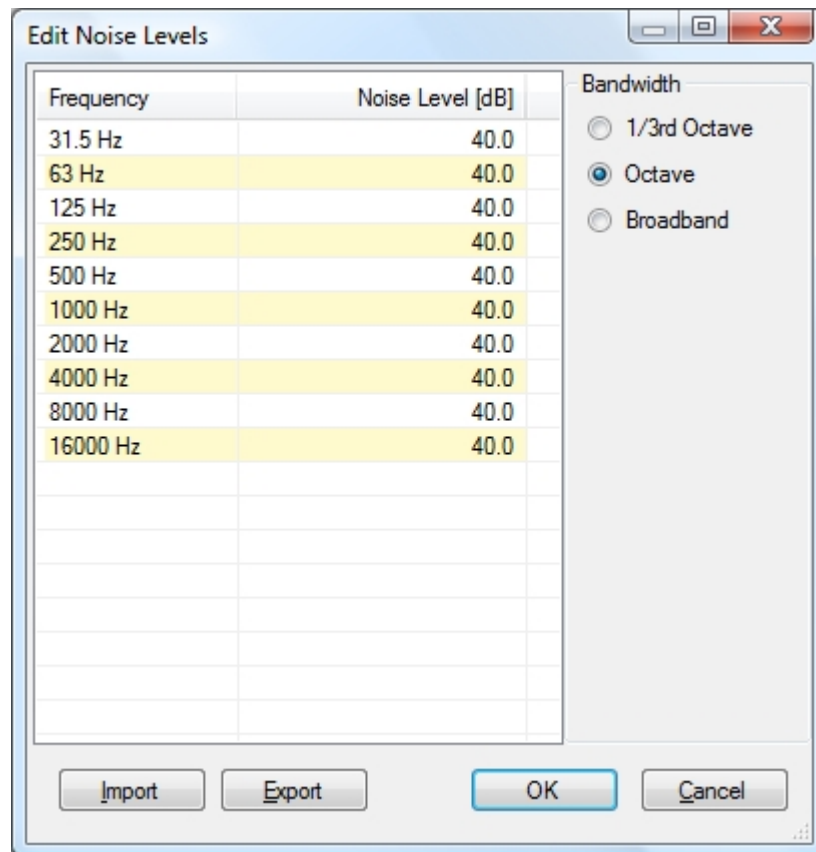
Alternatively, you can perform the same operation by selecting 'EDIT | MOVE ORIGIN' in the main menu.





## 6.9 Noise Settings

If you have activated the Extended mode, in the Project Properties window (page 11) you will see a Noise Settings button at the bottom, next to the Project Settings button. Clicking it will open the Edit Noise Levels window, where you can define noise levels for broadband, per octave or per one-third octave. You can even import noise level files in the CON:SEQUENZA+ format, or export levels that you have just defined.



Once you have defined the noise levels, it is possible to view S/N Ratio mappings. These can be selected in the Mapping Toolbar, as an alternative to non-weighted SPL mappings and A-weighted mappings (page 42).