ASTRO SPATIAL AUDIO

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SpatialSound Wave V4.2

Users Manual

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ASTRO SPATIAL AUDIO

1 SpatialSound Wave – An Introduction

1.1 What is SpatialSound Wave?

With *SpatialSound Wave*, Fraunhofer IDMT introduces a versatile public address- and production system that permits the directional rendition of audio content, as well as acoustic environments – without limitation on sweet spot conditioned listener positions. Not only in matters of club and event irradiation, but also in planetariums and theme parks, a *SpatialSound Wave* system can be reliably deployed for public addressing, as installed system, for promotional purposes or even three-dimensional audio-visual simulations.

SpatialSound Wave is based on longstanding experience of Fraunhofer IDMT in the field of spatial audio rendition like wave field synthesis. With *SpatialSound Wave*, the Fraunhofer experts have created a compact and versatile system for spatial rendition. Even without a fully closed driver setup, *SpatialSound Wave* is a guarantor for acoustic immersion.

SpatialSound Wave includes a fully scalable surround sound feature that may be individually adjusted to your quality requirements and any kind of spatial environment. The system provides, among other things, enhanced sweet spot areas as well as a powerful toolset for placing, moving and automating virtual sound sources in real time.

A running system is fully upgradeable to render real 3D-Sources if certain speaker setup requirements are met. The unique feature to freely use and design sound objects distinctively enables *SpatialSound Wave* to render either live or playback content to produce effective shows.

Optionally *SpatialSound Wave* is capable of a dynamic-interactive acoustic room simulation. The rendered surround sound may be individually adjusted to specifications of an event for example speech processing or concert acoustics.

1.2 Overview

The centrepiece of a *SpatialSound Wave (SSW)* System consists of the renderer, which is a Linux-based Audio-Server.

A second PC, the player unit, delivers a sound signal and can directly be connected via MADI, Dante or via A-D converter. There are basically no restrictions about the player unit, PCs or Macs with any digital audio workstations may be used.

On the output-side, the system is directly plugged to amps and speakers via DA-converter. All audio signals are transferred via MADI or Dante interfaces. Synchronization to existing equipment is realized by word clock and LTC or Dante.

1.3 SpatialSound Wave

SpatialSound Wave (SSW) is a browser-based graphical user interface that allows an intuitive control of *SSW*-Systems in various use cases. *SSW* comprises several apps, designed to perfectly fit distinct use cases such as the *Live!App*, the *Cue Editor*, the *SffPlayer* and the *ProductionApp*.

The server hosting the apps is part of the renderer unit. A connection to a (local) network provides access via clients such as PC, Mac, tablet or smartphone.

This manual serves the purpose to explain the configuration of a player unit and provides a detailed summary of *SpatialSound Waves* applications and their respective functions.

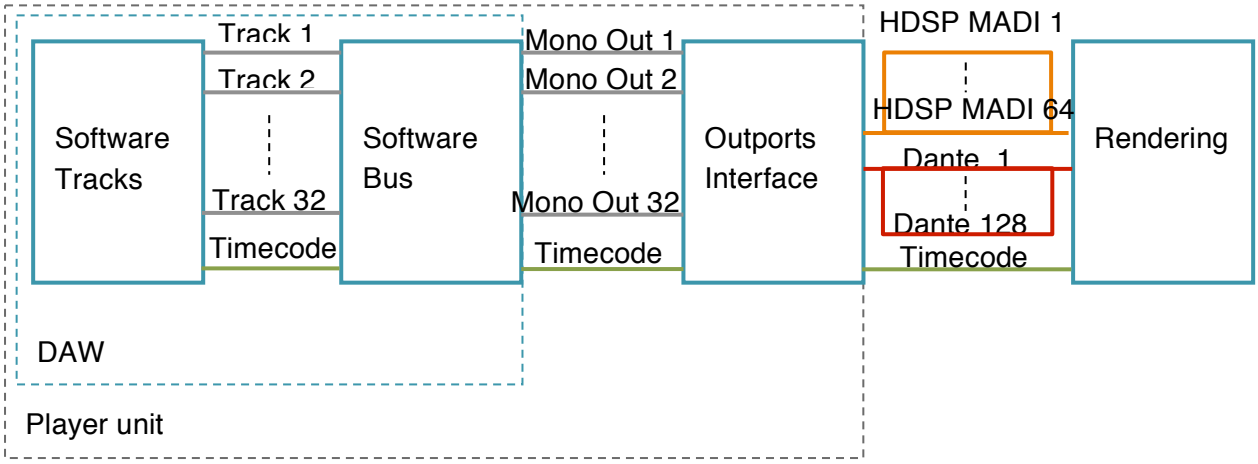
2 System installation

2.1 Configuring external sources

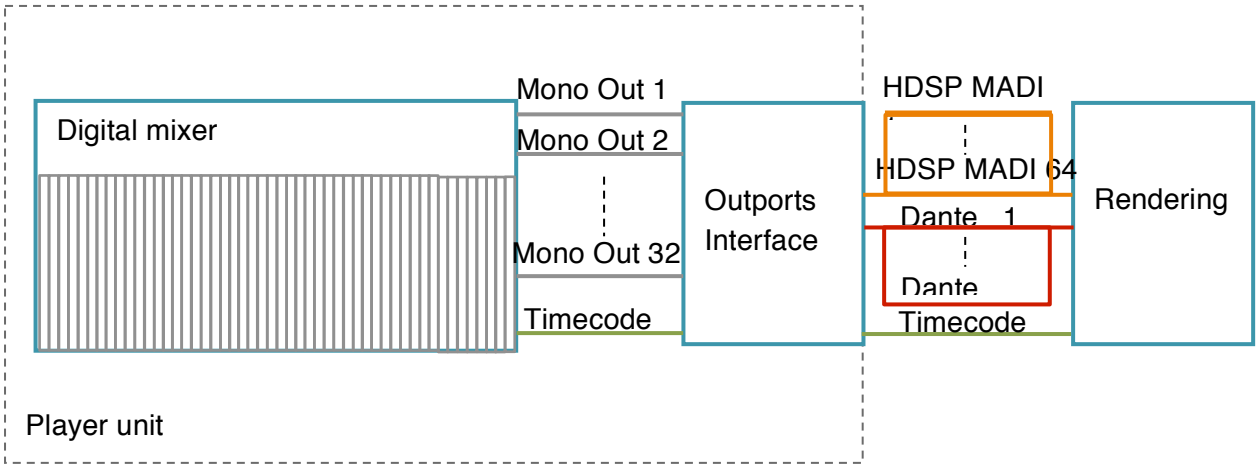
Connecting a player unit to a *SSW* system is a rather similar process for either *DAW*s or digital mixers.

! Be aware you only need one kind of connection from the Outports of the Interface, either a MADI or a Dante connection.

PC/Mac as player unit:



Mixer as player unit:



2.2 USB-Dongle

To make sure, Fraunhofer technology and licenses are respected, there is need for an USB-dongle that is delivered with the system. Said dongle has to be connected to a USB-port of the rendering unit.

2.3 Creation of a master project

Initially the player unit (PC/Mac) and its DAW have to be connected to the rendering unit via MADI or Dante.

Player unit MADI/Dante OUT → rendering unit MADI/Dante IN

If an audio project is subject of the mix, all tracks (max. 32 tracks) of the project are aligned at timecode position 00:00:00:00 in the DAW.

In case of a live input, all DAW/mixer inputs are configured respectively.

In addition another mono track has to be created. It will host a timecode that is sent to the rendering unit.

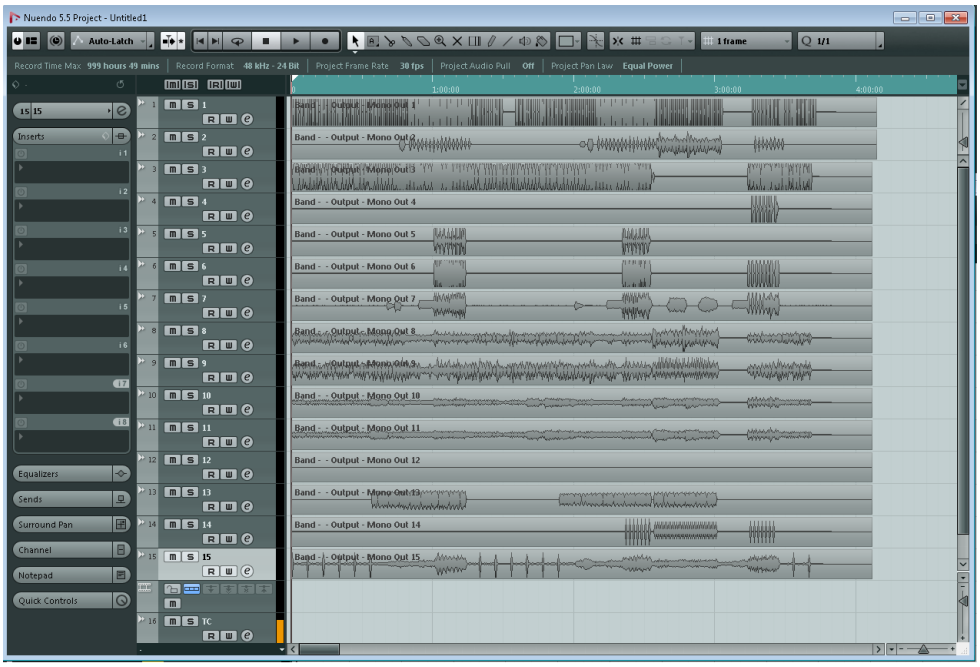


Fig. 1 Nuendo master project; 15 audio tracks, one video and one timecode track

2.4 Routing

Routing is accomplished by creating the needed output busses (mono) in the output routing configurator (Number of tracks +1 timecode hosting track). If new output busses are created, channels are normally mapped to their respective audio interface output ports.

Example:

Mono out 1 → Output port 1 audio interface (HDSP MADI 1)
Mono out 2 → Output port 2 audio interface (HDSP MADI 2)
…
Mono out 16 → Output port 64 audio interface (HDSP MADI 64)

The last channel is used for hosting a timecode track, which should always be routed to the last available output channel of the interface (here: Output port 64 of the HDSP MADI interface).

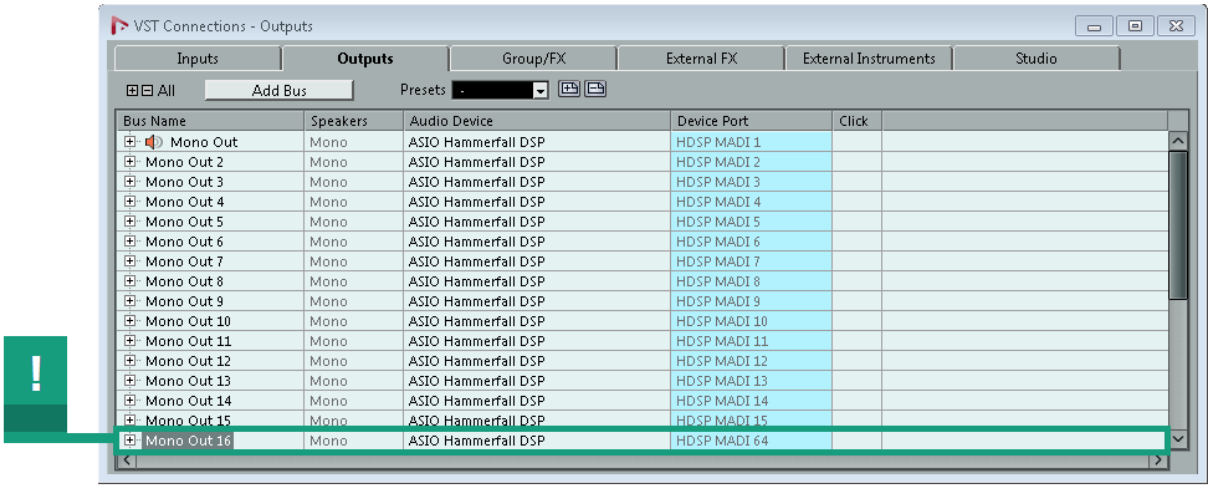


Fig. 2 Nuendo output routing

In the next step, all tracks have to be routed on their respective busses. This is accomplished by configuring the outputs in the *Nuendo* mixer.

Example:

Track 1 → Mono Out 1
Track 2 → Mono Out 2
…
Track 16 → Mono Out 16 (Timecode track; this bus has already been routed in the output configuration to HDSP MADI 64)

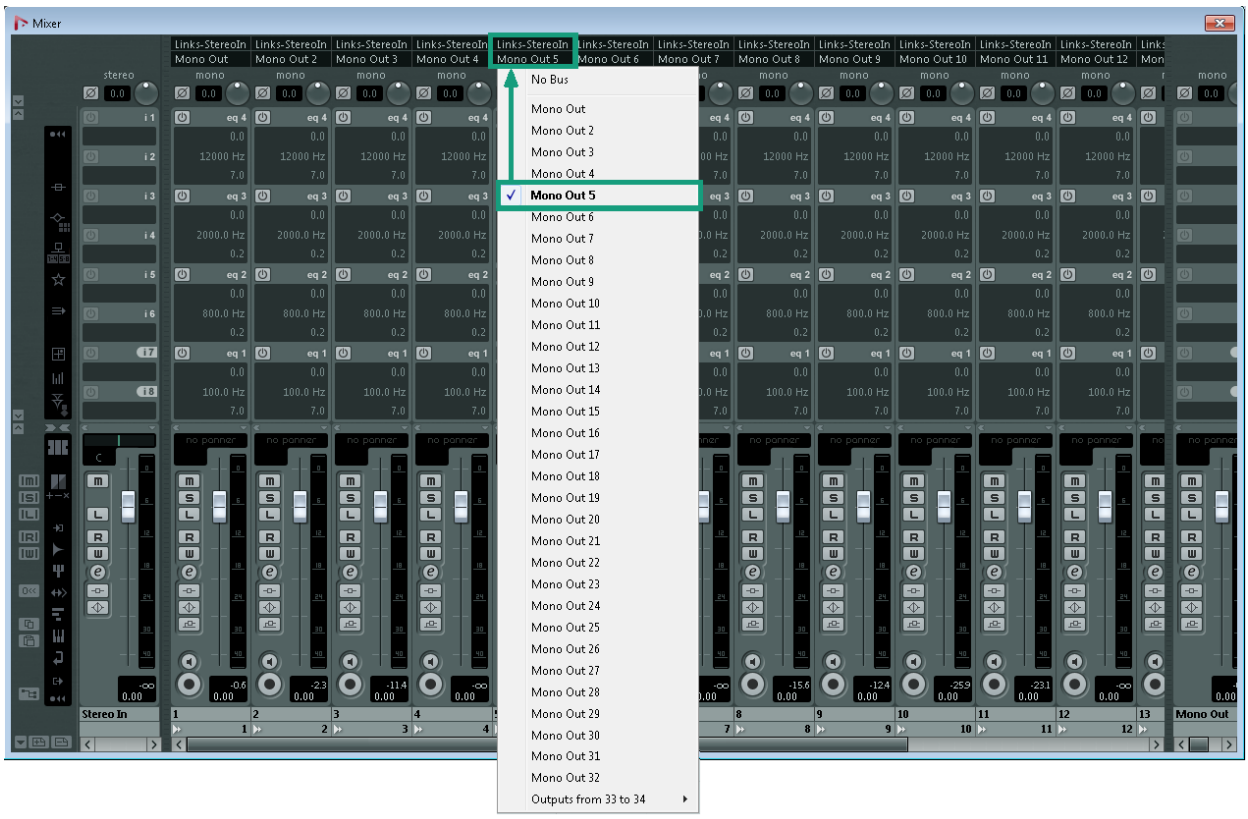


Fig. 3 Nuendo Mixer routing

! If several tracks want to be made movable by mapping them to one source, they have to be routed to the same output channel.

2.5 Timecode

There are several different ways of sending timecode to the rendering unit. Either external or internal timecode generators, for instance the DAW, may be used. In every case timecode has to be routed on a designated channel (in this example channel 64).

! Timecode should not be routed on an active output channel since it will be treated as an audio signal and played by the speakers.

2.6 Stereo tracks

The player unit will only transport mono tracks to the rendering unit. Hence stereo signals have to be split into the channels left and right. Afterwards, the extracted mono files have to be put in different DAW tracks. The player unit always sends content to the renderer. In a later production stage, both signals can be easily positioned in the *Production App (see 3.5)* by placing them in their respective panorama slots (left or right).

3 SpatialSound Wave

The following chapter will focus on *SpatialSound Wave (SSW)* and its sub-applications. *SSW* is designed to exclusively synergize with *Google Chrome.*

3.1 Home Menu

After *SSW* has been successfully installed, it can be easily accessed by entering the Server IP in *Chrome*.
The home menu provides use case dependent access on several subordinate applications of *SSW*, which can be opened by clicking on their respective button. The home menu looks may vary, depending on the installed features.

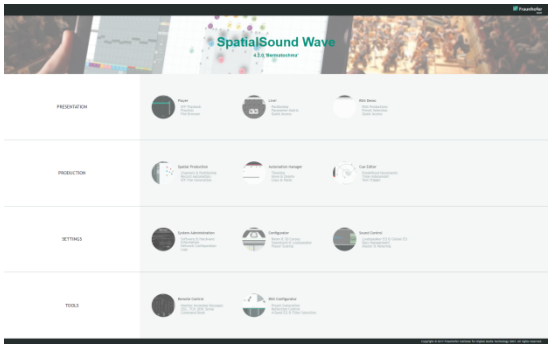


Fig. 4 SpatialSound Wave Home Menu

3.2 Configurator

The *Configurator App* is a tool to create new SSW system *Setups*. All basic settings for the SSW system can be edited here.

Fig. 5 Configurator with opened Setup Browser

1. **Setup browser:** Browser to manage different SSW system *setups*. Save, load, download or upload *setups*.

3.2.1 Room Tab

Fig. 6 Configurator - Room Tab

1. **Room dimensions:** Define room size in meters, for width (x), length (y) and height (z). This is needed for basic scaling.
2. **Listener Area:** Define the listener area in meters. The given values are interpreted as Cartesian coordinates in the form (x1,x2,y1,y2). This points will serve as corners for the square, defining the Listener Area.

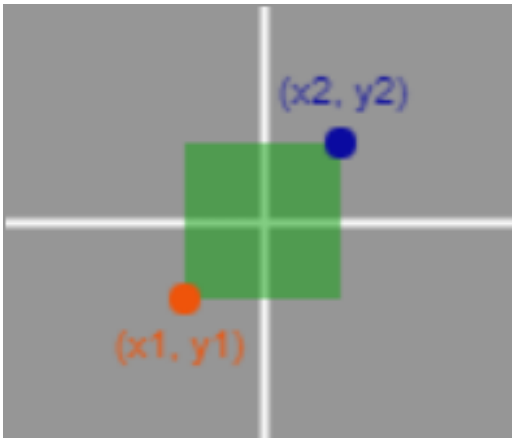


Fig. 7 Listener Area Coordinates

3.2.2 Soundcard Configuration Tab

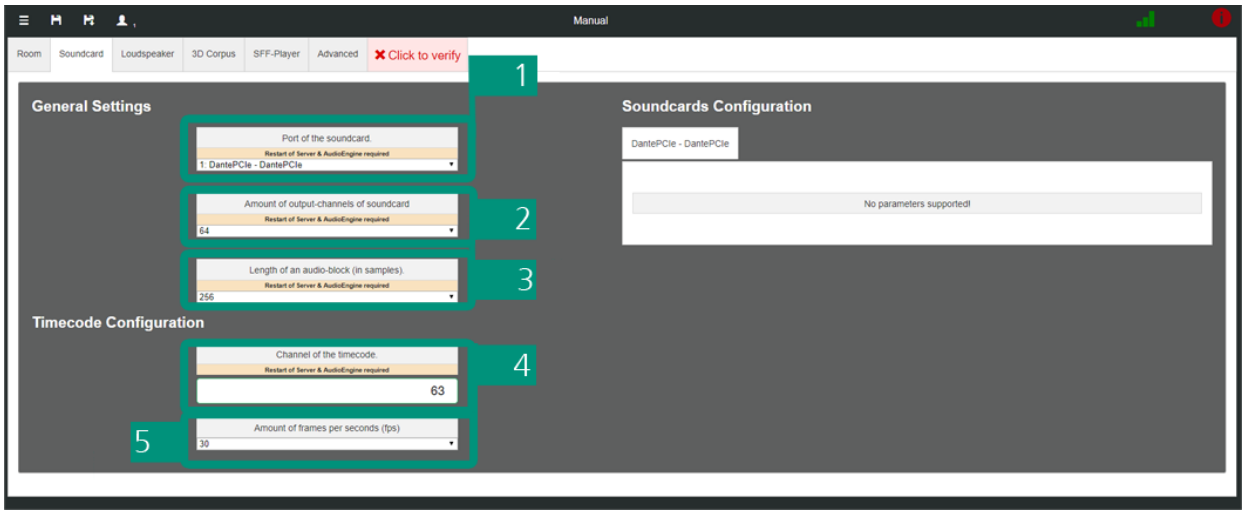


Fig. 8 Configurator - Soundcard Configuration Tab

1. **Soundcard:** Dropdown-Menu to select which of the installed soundcards of the renderer should be used.
2. **Output-channel size:** Select amount of output channels. Switch between 32, 48, 64, 80, 96, 112 or 128 channels. This setting affects the workload of the used renderer machine.
3. **Audio-block size:** Select length of the audio-blocks in samples. Switch between 64, 128, 256 or 512. This setting affects the workload of the used renderer machine.
4. **Channel of timecode:** Select channel of timecode. This is the channel where the soundcard should receive timecode from another source.
5. **Framesize of Timecode:** Defines framesize of the timecode in fps. Switch between 24 fps, 25 fps, 29,97 fps or 30 fps.

3.2.3 Loudspeaker Configuration Tab

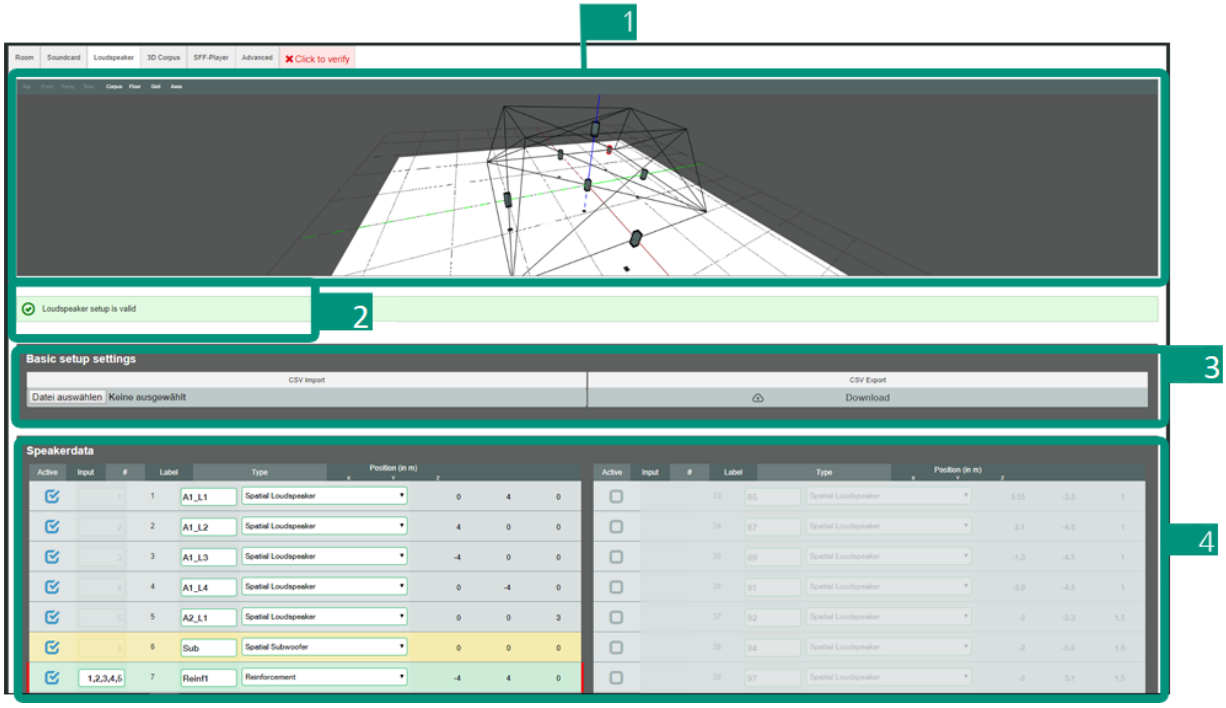


Fig. 9 Configurator - Loudspeaker Configuration Tab

1. **3D View:** Shows a 3D model of the loudspeaker system. All active loudspeakers and the 3D corpus will be shown here.
2. **Loudspeaker setup check:** Checks the validity of the loudspeaker setup.
3. **Import/Export CSV:** Import or export a CSV file from or to the remote PC.
4. **Speakerdata:** Management of all loudspeakers of the selected setup. Change Label, Type of loudspeakers and data of the Cartesian coordinates for each used loudspeaker individually.

3.2.3.1 Speakerdata

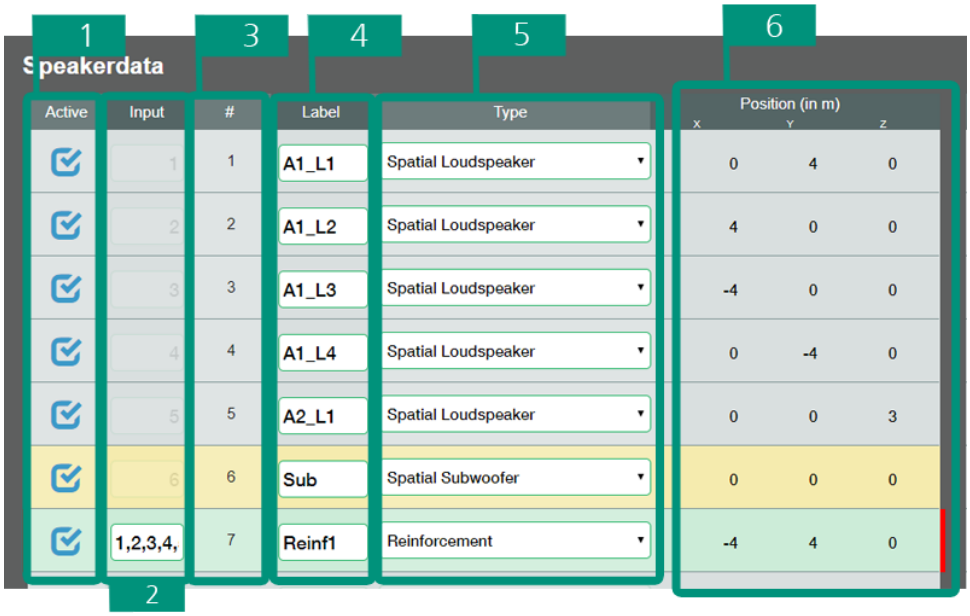


Fig. 10 Loudspeaker Configuration - Speakerdata

1. **Active loudspeaker:** Activates or deactivates a loudspeaker.
2. **Reinforcement Input**: Choose one or more inputs for the reinforcement speakers. This can also be done, using the *Reinforcement Routing Matrix* (see 3.3.4).
3. **Number of loudspeaker:** Number of speaker channel.
4. **Loudspeaker label:** Rename the loudspeakers.
5. **Type of loudspeakers:** Choose type of loudspeaker for the selected channel. Switch between Spatial Loudspeaker, Subwoofer and Reinforcement Speaker.
6. **Loudspeaker positions:** Define the Cartesian Coordinates of the speakers.

3.2.4 3D Corpus Configuration Tab

It's possible to change the shape and the size of the *3D Corpus*. The shape and the size of the *Corpus* define the movement of the objects in the z-axis.

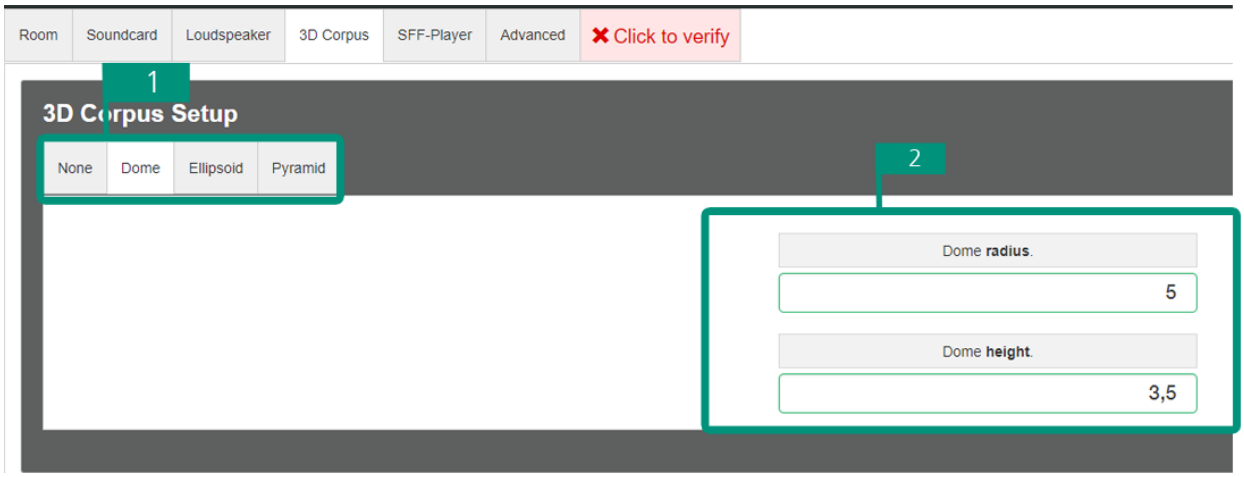


Fig. 11 Configurator - 3D Corpus Configuration

1. **Corpus Selection:** Choose the Corpus you want to use.
   - **None:** No *Corpus* – objects don't move in the z-axis and objects remain by z = 0 or the given manual z-value.
   - **Dome:** Domed C*orpus* with adjustable radius and height.

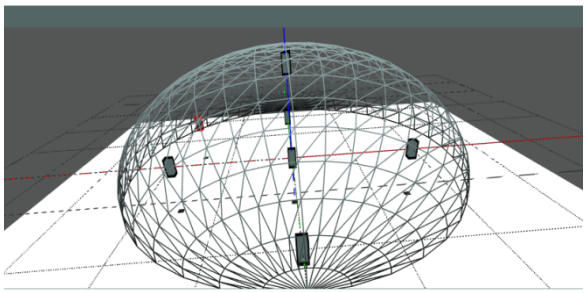


Fig. 12 Dome-Corpus

- **Ellipsoid:** Elliptical *Corpus* with adjustable width, length and height.

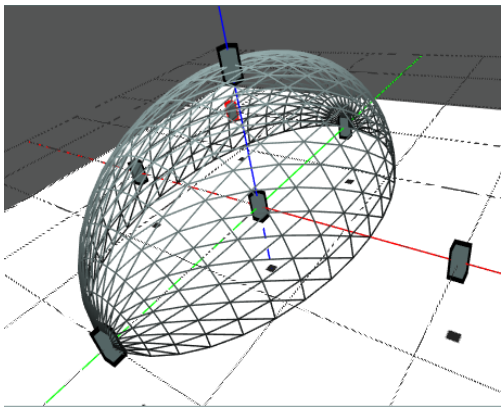


Fig. 13 Ellipsoid-Corpus

- **Pyramid:** Pyramidal *Corpus* with adjustable sizes of the ground- and stump area.

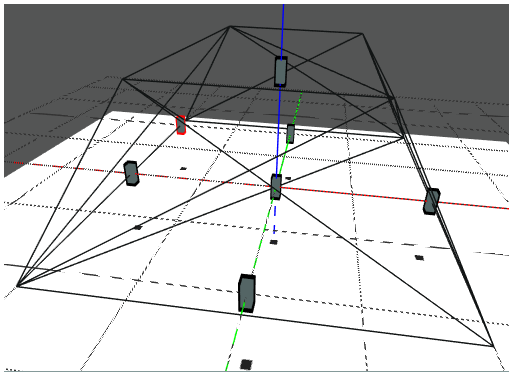


Fig. 14 Pyramid-Corpus

2. **Corpus Parameters:** Enter the dimensions of the *Corpus* you wish to use.

You can see the resulting form in the 3D Canvas of the *Loudspeaker Configuration Tab*.

3.2.5 SFF-Player Tab

With the *SFF-Player Tab* in the *Configurator* it's possible to change the global scaling factor of your *SFF Files*. X, Y and Z –Coordinates can be adjusted individually.

Fig. 15 Configurator - SFF-Player Scaling

3.2.6 Verifying your Setup

To be able to load and use the *Setup* you've created, you have to verify your *Setup first*.

If your *Setup* is not verified, it won't be able to load/start it in other Applications of SSW.

! You can Verify your Setup by click the "Click to Verify" Button of the Configurator.

Fig. 16 Buttonchange after successfully verifying the Setup

If the *Setup* was verified successfully, the button will change its appearance. If you change the *Setup*, e.g. Loudspeaker Position or Soundcard Configuration, the *Setup* will become unverified and you will have to verify it again.

3.3 Sound Control

The *Sound Control App* is the central application to get the full control of the loudspeakersystem. This includes an equalizer for every output, a signalgenerator, a loudspeakermanagement with bassmanagement, a global equalizer, metering for all in and outputs and a masterfader.

3.3.1 Loudspeaker EQ Tab

With the *Loudspeaker EQ* it's possible to adjust frequency responses, gain and delay for every single loudspeaker. For a good sounding system it's nessecary that all loudspeakers have a similar frequency, time response and a equal level. This depends on your room and your speakersetup.

Fig. 17 Sound Control - Loudspeaker EQ Tab

3.3.1.1 Speakers

All active speaker channels in the *Setup* will be shown here. There are different colors for three different types of speakers. Delay [ms], gain [dB] and labels can be changed for all outputs.

1. **Speaker Navigation:** Move to the previous or next loudspeaker.
2. **Spatial Loudspeaker:** Basslimited loudspeakers for spatial PA.
3. **Subwoofer (yellow):** Bandlimited loudspeakers for low frequencies.
4. **Reinforcement Loudspeaker (green):** Expands the outputs of the soundsystem. The input of these types of loudspeakers can be defined freely in the loudspeaker setup in the *Configurator* or in the *Reinforcement Routing Matrix* (see 3.3.4). All spatial loudspeaker- and subwoofer channels which are active in the *Setup* can be choosen as an input.

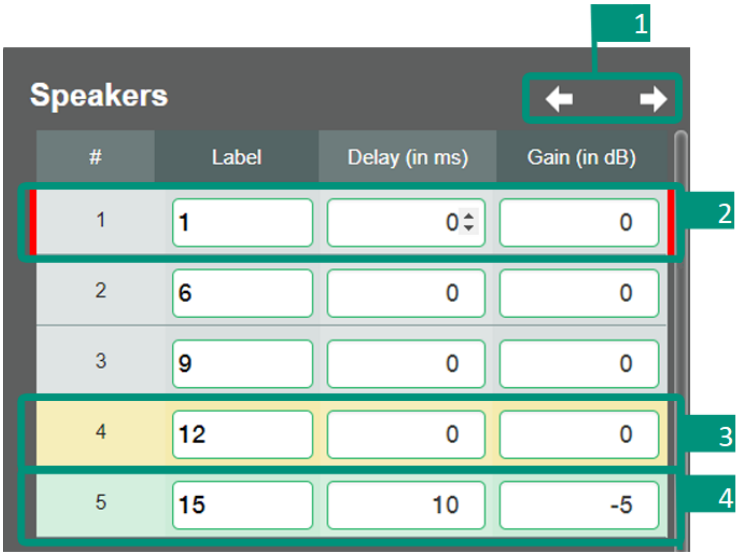


Fig. 18 Loudspeaker EQ Tab - Speakers

3.3.1.2 Bypassing Loudspeaker EQ

This bypasses the equalizer in every output. All signals will be played directly to the speakers without equalization.

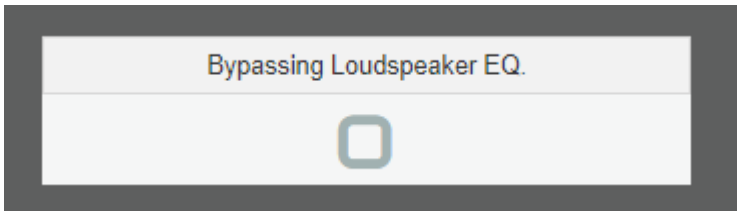


Fig. 19 Loudspeaker EQ Tab - Bypassing Loudspeaker EQ

3.3.1.3 Test Signal Generator

This is a signal generator with a selection of different excitation signals. You can use pregenerated measurement signals or the external signal input.

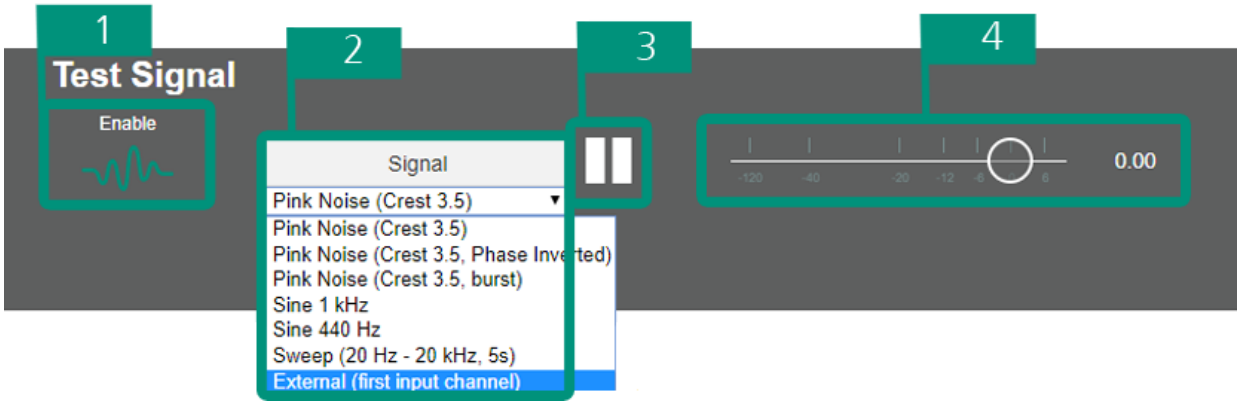


Fig. 20 Loudspeaker EQ Tab - Test Signal Generator

1. **Test Signal Enabled/Disabled:** Activates or deactivates the signal generator.
2. **Signal Selection:** Choose different pregenerated signals or use a external signal. The external input is set to the first hardware input of the soundcard.
3. **Play/Pause:** Play or pause the test signal. To play a external signal it has to be also set to play.
4. **Test Signal Volume:** Changes the volume of the test signal in dB. The initial outputvolume is set to -50 dB.

The test signal will only be played by the selected loudspeaker. The test signal is post bassmanagement, which means that the crossoversettings have no influence to the signal and will be played fullrange to the loudspeakers.

! **This tool has to be handled with care, to much signalgain can damage loudspeakers and ears!**

3.3.1.4 Equalizer

For every output channel there is a full parametric 16-band equalizer. It's possible to change the frequency [Hz], the quality, the filtertype and the gain [dB]. There are four different filtertypes: peak, notch, highpass (12dB/oct) and lowpass (12dB/oct).

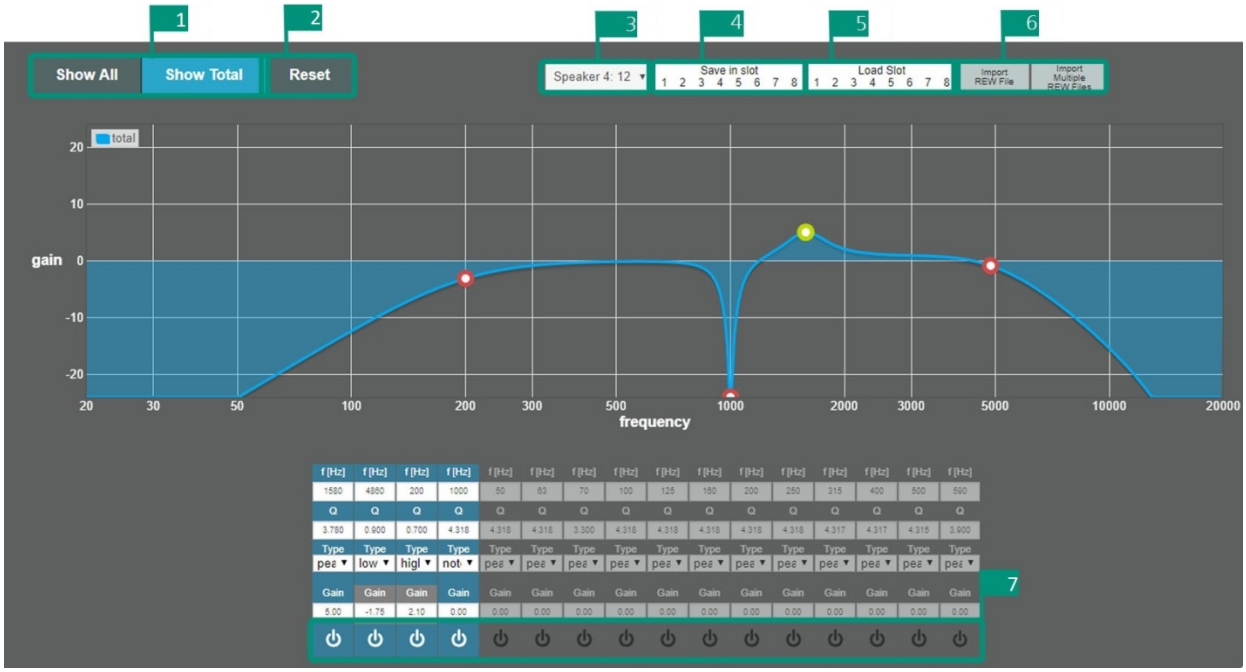


Fig. 21 Loudspeaker EQ Tab - Equalizer

1. **Filterview:** Switch between two visual modes of the filtercurves. "Show Total" shows the resulting filtercurve, whereas "Show All" shows all single bands.
2. **Reset:** Sets all EQ settings to the initial values.
3. **Speakerselection:** Select the speakers on which you want to make changes.
4. **Filterbank save:** Save filtercurve of current loudspeaker to slots.
5. **Filterbank load:** Load saved filtercurves to current loudspeaker.

6. **Import REW Files:** Import filterfiles (.txt) which were generated with REW (Room Eq Wizard). The .txt files have to correspond to the following structure:

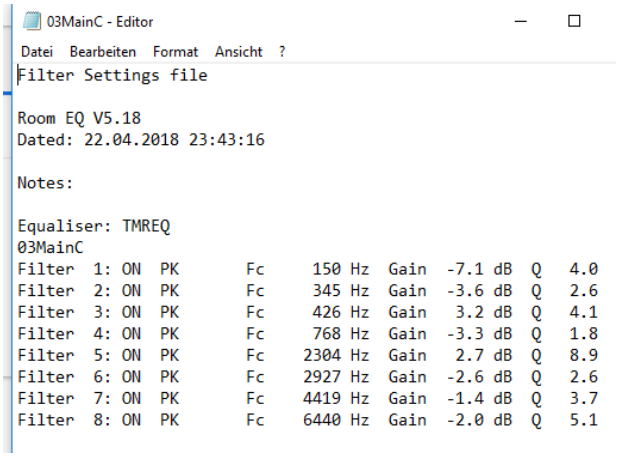


Fig. 22 REW Filter txt-File

7. **Filterband On/Off:** Activates or deactivates the corresponding filterband.

3.3.2 Bass Management Tab

The fundamental principle of “bass management” is that “bass” content in the incoming signals should be directed only to loudspeakers capable of handling it. There are two types of loudspeakers – subwoofer and spatial loudspeakers. The fullrange signals have to be divided into subwoofer signals (**2**) and spatial loudspeaker (**1**) signals, that the appropriate loudspeakers play correctly in their frequency ranges. In the *Bass Management* all crossover settings can be changed and corresponding adjustments for the loudspeakers can be made. For every path of signals the frequency [Hz] and the slope (12,24,36,48 dB/oct) can be changed and bypassed. The frequency graphic on the right shows all active filters.

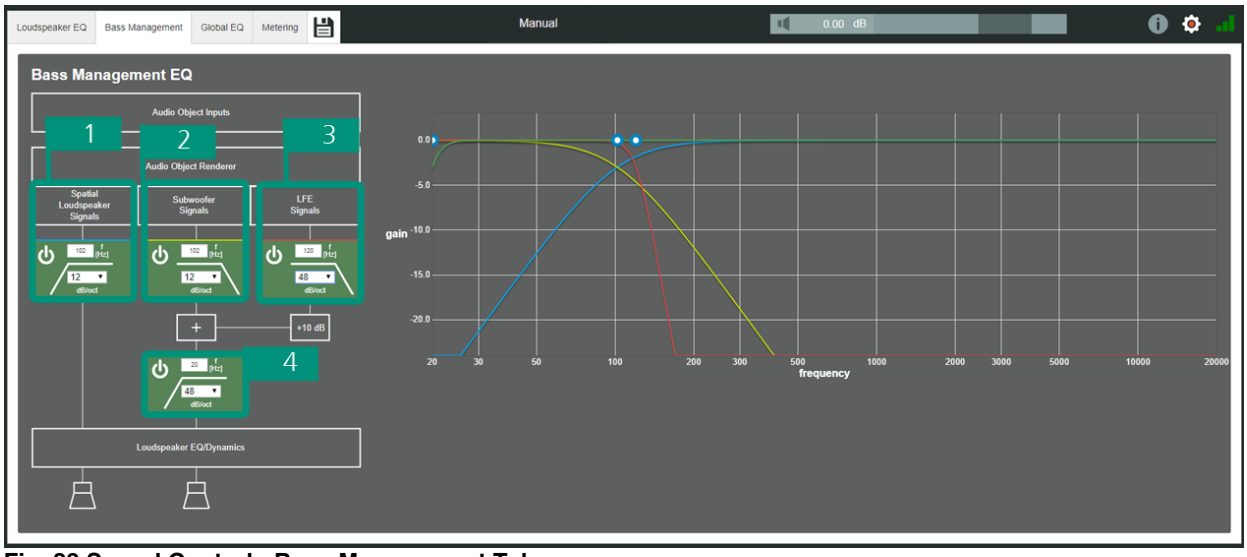


Fig. 23 Sound Control - Bass Management Tab

1. **Spatial Loudspeaker Highpass Filter:** Highpass filter with adjustable frequency and slope.
2. **Subwoofer Lowpass Filter:** Lowpass filter with adjustable frequency and slope for all subwoofers.
3. **LFE Lowpass Filter:** Lowpass filter with adjustable frequency and slope for LFE signals. Additional to the subwoofer signals there are LFE-signals. The short form “LFE” stands for low frequency effects and can be used to push the low frequencies for special effects. In the *Production App* there is a LFE-flag for every channel, where the LFE can be activated. All LFE Signals are basically fullrange signals until they get filtered through the bassmanagement. The crossover frequency is 120 Hz with the Dolby Digital standard and 80 Hz with the DTS standard with a steep filter of 48dB/oct. The LFE channel standardly is 10 dB louder than the main channels. This can be changed in the *Configurator App* (see *3.2*).

4. **Subwoofer Highpass Filter:** Highpass filter with adjustable frequency and slope for all subwoofers + LFE. This can be used to relieve subwoofers from low frequencys which they can't reproduce anyway.

3.3.3 Global EQ Tab

The *Global EQ* is a seven band master equalizer for the complete system. This means, all adjustments affect all outputs. This tool can be used to change the global sound.

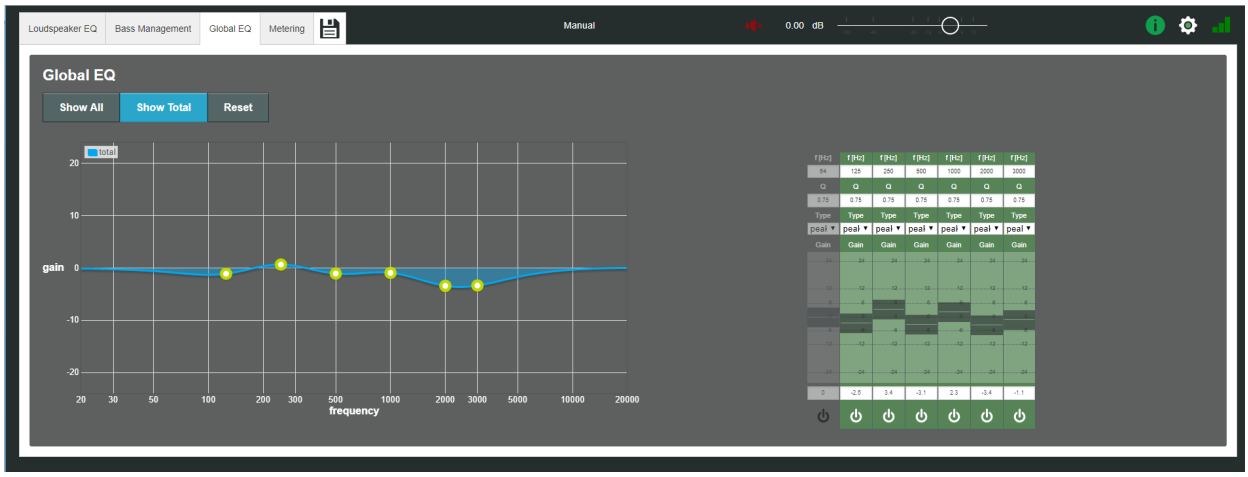


Fig. 24 Sound Control - Global EQ Tab

3.3.4 Reinforcement Routing Tab

The *Reinforcement Routing* allows to freely route different spatial inputs to *Reinforcement-Speakers*. It's possible to sum two or more signals to one output.

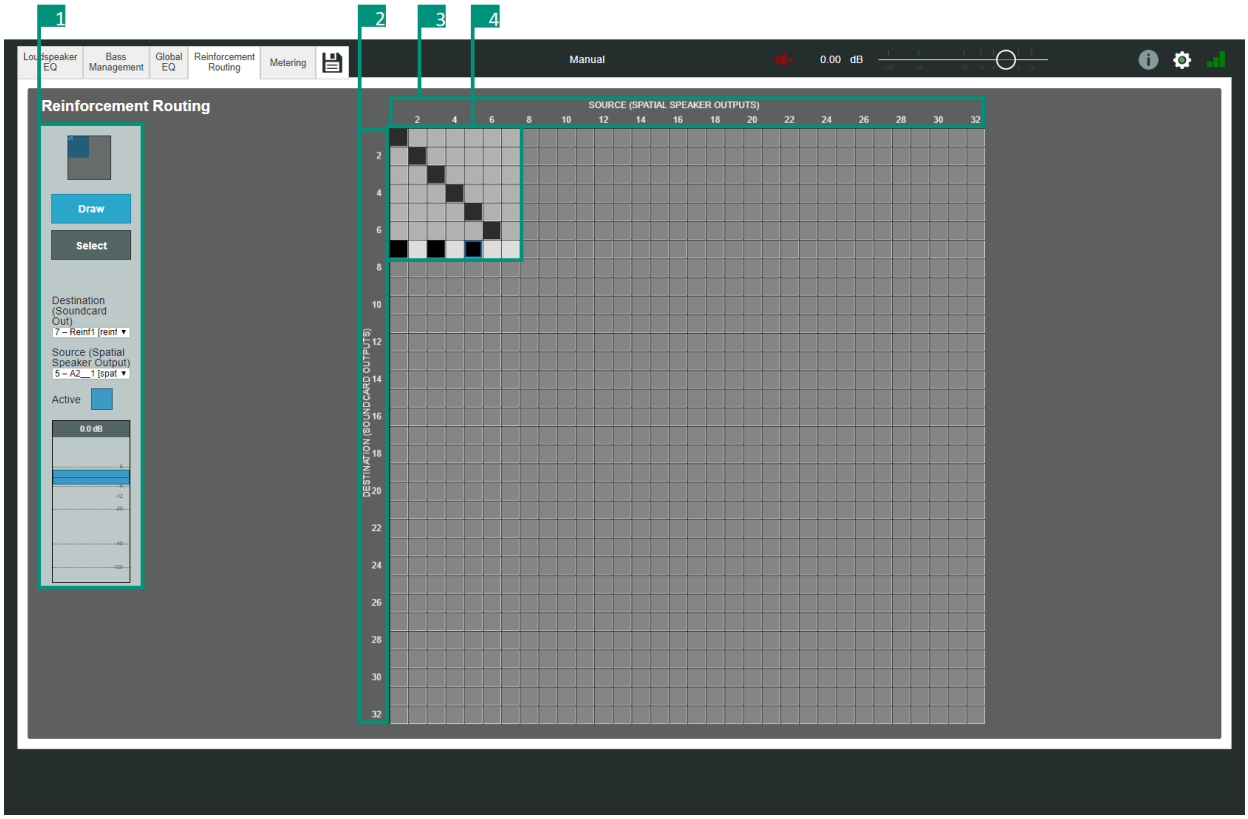


Fig. 25 Sound Control - Reinforcement Routing Tab

1. **Reinforcement Options:** F.t.t.b.:
    - **Viewport:** Selection of which part of the *Routing-Matrix* should be shown.
    - **Draw-Button:** If selected the *Reinforcement Routing* can be drawn, which means its possible to keep the left mouse button clicked and then move across the *Routing-Matrix* to activate/deactive multiple sources.
    - **Select-Button:** If selected, by clicking on a Source/Destination combination of the *Routing-Matrix* the combination will be selected, but not activated. To activate this combination the Activation/Deactivation Button has to be used.
    - **Destination Selection:** Dropdown menu to select to which *Reinforcement Speaker* the audio shall be routed.

- **Source Selection:** Dropdown menu to select from which *Spatial Speaker* the audio shall be routed.
- **Activation/Deactivation Button:** Button to activate or deactivate the routing of the selected *Spatial Speaker* to the currently selected *Reinforcement Speaker*.
- **Gainfader:** Fader to change the *gain* of selected input.

2. **Destination:** *Reinforcement Speaker* output.
3. **Source:** Shows outputs of all active *Spatial Speakers*.
4. **Routing Matrix:** Graphical depiction and selection of *Reinforcement Routing*.

3.3.5 Metering Tab

Fig. 26 Sound Control - Metering Tab

1. **Output Mastering:** Control the level of the different applications (production, player) and the masterlevel. The faders of production and player are linked to the fader in the corresponding app.
2. **Save Icon:** On click saves all changes.
3. **Input Metering:** Displays all incoming Signals.
4. **Master Fader:** Control the masterlevel.
5. **Output Metering:** Displays all outgoing Signals.

To see more than 32 channels, you can click the left mousebutton one second in the metering, then you can choose between 32, 64 and 128 meters.

3.4 Room Simulation Module – Configurator

The *Room Simulation Module* (RSM) is the application for 3D reverberation and reverberation time extension. It is linked with the *Production-* or *Live App*. With this application it is possible to turn the acoustics of every room e.g. into a big sounding concert hall or a church.

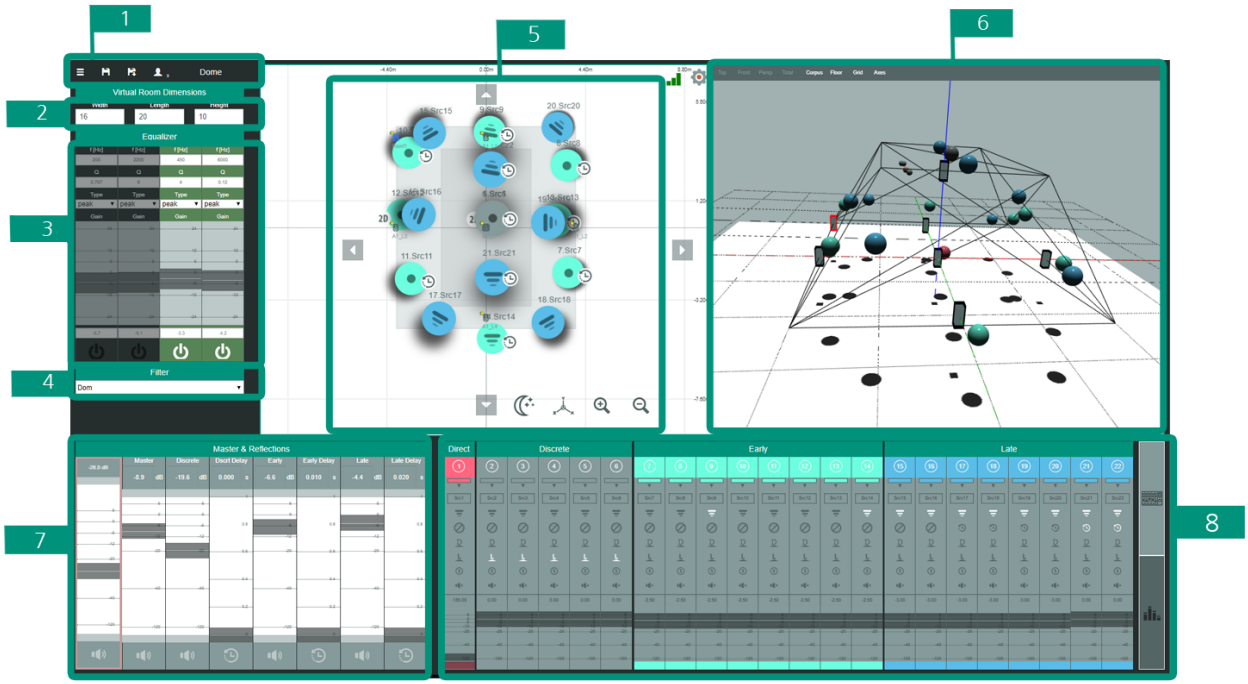


Fig. 27 RSM - Configurator

There are different presets to choose between different types of rooms with different reverberation times. The different parts of reflections are separated in discrete reflections, early reflections and late reflections which can be controlled in volume and delay individually. There is one direct object, five discrete objects, eight early and eight late objects.

1. **RSM Preset Browser:** Save, load or create new *RSM Presets*.
2. **Virtual Room Dimensions**: Change the virtual room dimensions for discrete reflections.
3. **RSM Equalizer:** Parametric equalizer for changing the global sound of the room simulation.
4. **RSM Filter type:** These are different room impulse response sets, to switch between different room sounds. There are seven different types of rooms.
    - **Auditorium:** Short room with small amount of reverberation for speech, stage play or lecture. Can be used to increase the intelligibility.
    - **Dome:** Huge room with a very long reverberation time. Can be used as effect or to extend the reverberation time of a room.

- **Kammermusik:** Medium room with a moderate reverberation time for chamber music or jazz.
- **Kirche:** Big sounding room like a church. Can be used for different types of music which need a big natural sound with long sustain.
- **Konferenzraum:** Small room for speech, like a conference room.
- **Konzerthalle:** Concert hall with a medium reverberation time for different kinds of music.
- **Rockstage:** Medium room for live sound feeling. Can be used for different kinds of music like rock, pop, jazz or electronic.

5. **2D Object Canvas:** All positions of the objects of the *RSM Sessions* are shown here in top view. All objects can be moved. You can also see the positions of the loudspeakers of the selected *Setup*.
6. **3D Object Canvas:** All positions of the objects of the *RSM Sessions* are shown here in a 3D view. You can also see the positions of the loudspeakers of the selected *Setup*.
7. **Master and Reflections:** Volume control of the RSM Master & System Master. You can also control the global volume and delay of every single type of reflection (discrete, early and lates) individually.
8. **Object Controls:** Control all settings for every RSM object. Select and control the volume for the direct source, discrete, early and late *Sources* individually.You can also enable or disable *Plane Wave*, *Distant Dependend Delay*, *Distant Dependend Loudness*, *Solo* or *Mute*.

3.5 Production App

The *Production App* is by far the largest application of *SSW*. The following chapter illustrates its functions and features.

3.5.1 Full-screen view

The following image shows a general overview of the user interface and its functions.

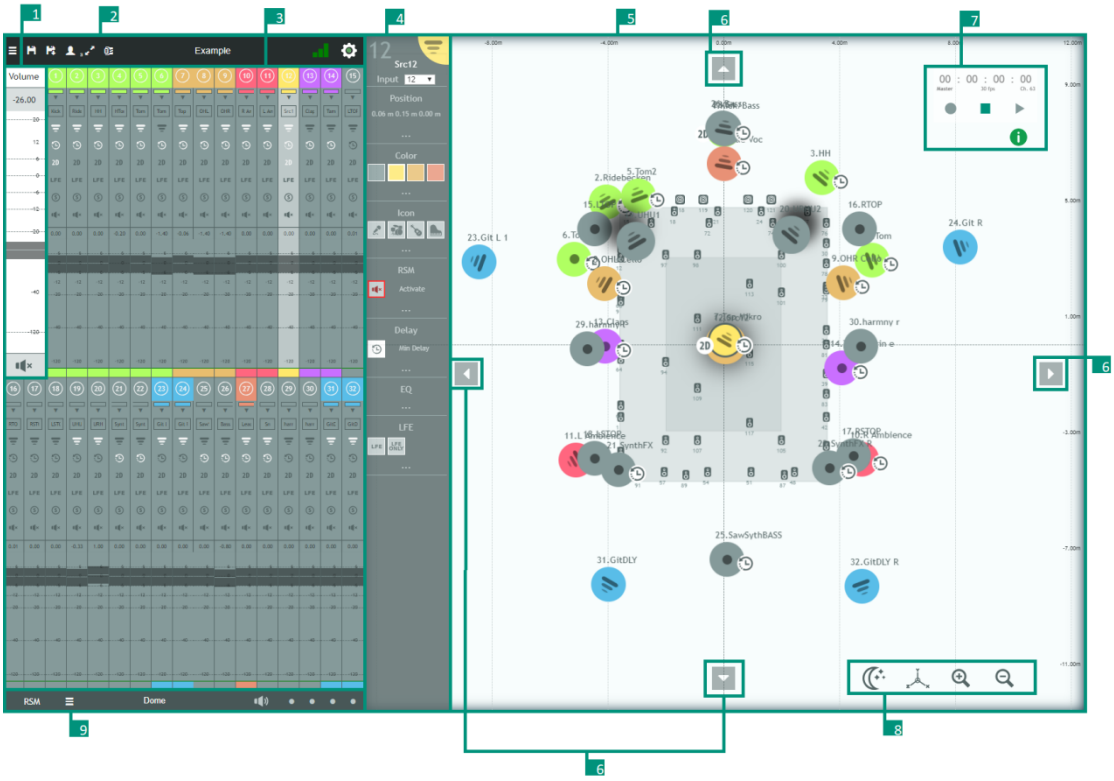


Fig. 28 Production App main screen

1. **Volume Fader:** This volume fader provides volume adjustment and metering for the *Production App*.
2. **Session-Management-Bar:** The *Session-Management-Bar* provides access to all aspects of .uifm-file management, *Scaling*, *Sff-Generation*, Latency and the rendering unit status.
3. **Sourcestrips:** The *Sourcestrips* enable direct triggering and source manipulation of player unit content.
4. **Source Modifier:** Enhanced access to the features of a chosen *Source*.
5. **Source Canvas:** The *Source Canvas* provides a freely scalable top-down room layout and enables the user the graphical positioning of *Sources* which are defined by their respective *Sourcestrip*. Both static and dynamic *Sources* are realizable.
6. **Canvas Navigation Buttons:** Buttons to move the shown part of the *Source Canvas*.

7. **Timecode Control & Feedback-Tracker:** Representation of current Timecode as well as Timecode-Mode (Master or Slave) and channel on which Timecode ist expected. Buttons to start recording of Automations and Start/Stop Timecode (if mode = Master).
8. **Canvas Control Buttons:** Buttons to manipulate the canvas.
9. **RSM-Management-Bar:** Allows loading of different RSM-Presets.

3.5.2 User Interface

The following chapter will entirely focus on the elements of the full-screen view.

3.5.2.1 Session-Management and Settingscontrol

The *Session-Management-Bar* includes as follows (f.l.t.r.):

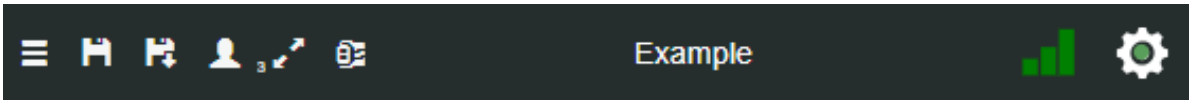


Fig. 29 Session management bar

Session Explorer: The Sessions Explorer is an efficient tool for session and folder management. Clicking on the *Menu button makes* the *Session Explorer* pop up.

1. **Navigation/New Session:** f.l.t.r.:
   - **Backward Symbol:** Provides navigation through created folder structures.
   - **New File Symbol:** After clicking on it, *a* naming prompt for a new *Session* is opened. By confirming with the Enter-Key a new *Session* will be created and opened up in the *Production App*.
   - **Directory Symbol:** After clicking on it a naming prompt for a new directory is opened. After confirming with the Enter-Key, the new directory is created and opened.

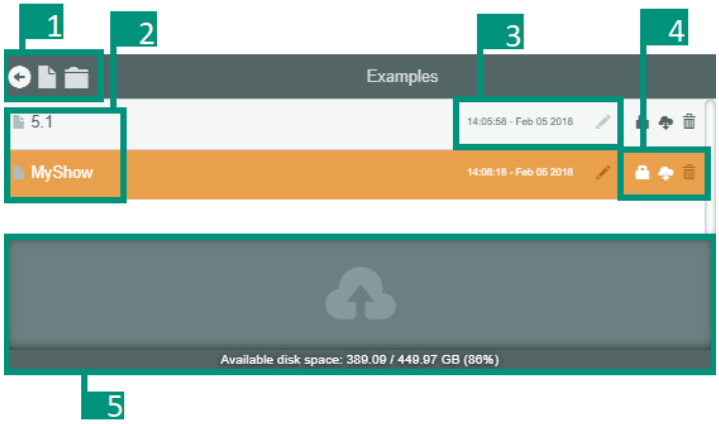


Fig. 30 Sessionexplorer

2. **Library:** Selection of *Session*/directories. Directories and *Sessions a*re opened by clicking on them. Before you open another *Session*, a saving prompt for the current *Session* will be displayed.
3. **Last Saved:** Time & date the *Session* was saved the last time.

4. **Sessiontool:** Modifier for single *Sessions*:
    - **Lock Symbol:** Prevents overwriting of marked *Sessions*.
    - **Cloud Symbol:** Exports the *Session* via browser download.
    - **Pastebin Symbol:** Deletes the marked *Session* after a confirmation dialogue.
5. **Importbar:** *Sessions* may be imported via system prompt(“click”) or “drag&drop”. The available disk-space and disk-space usage of the rendering unit are displayed as well.

User:

If you are logged in as Admin you have expanded access.

Fig. 31 Sessionexplorer entered in admin mode

3.5.2.2 About Admin Mode:

The use of the *Production App* often marks the very end of a production pipeline. In addition it is often used by multiple users. To prevent accidental overwriting etc. security measures have been taken, which are accesible and editable via admin mode. Two additional flags maybe set to protect saved sessions:

- **Edit Flag:** Activate/deactivate alteration of single *Sessions*.
- **Visibility Flag:** Toggle visibility of single *Sessions*.

A dropdown menu under the title allows the user to determine *Session* classes (user or rsm).

Scene Scaling: Session files are not bound to a specific rendition system and may be adjusted to any compatible setup/room type. *Scene scaling* enables the user to manipulate room dimensions of the current mix via scaling the *X* and *Y parameters* of the room layout. By clicking on the respective symbol a sub-menu is opened. Entering a (point) number afterwards and confirming by pressing „enter“, multiplies the entered factor with its respective rendition dimension. The setup is stretched or clinched. Changes in scale are visible on the *Source Canvas* immediately after the changing the factors.

! Scene scaling is not to be confused with the „zoom“ function on the *Source Canvas*.

SffGenerator: Opens a new window to generate Sff-Files from Audio-Files and the current *Session*, which can be played from the SffPlayer (see 3.9).

Session ID: *Session ID* shows the name of the currently opened *Session*.

Latency: Shows the current connection quality of the connection from the GUI to the rendering Unit. By hovering over it, the current Ping can be displayed.

Settingscontrol: Clicking on the *gear* symbol opens the so called *Settingscontrol* dropdown menu. In addition its centre indicates the rendering unit's status by 3 different colors.

Green → Renderer is running
Red → Renderer is stopped / Invalid Timecode
Yellow→ Connection establishing

The menu comprises of the following features (f. t. t. b.):

Audio, with rendering unit commands and timecode configurator

- **Setup:** Select used *Setup* for rendering
- **Stop**: Stops current rendering
- **Timecode:** Master/Slave configuration of timecode

System triggers the rendering unit directly:

- **Reboot Engine**: Reboots the rendering unit
- **Shutdown Engine:** Shuts the rendering unit down

View manages the visuals of the *Source Canvas*:

- **Show Grid:** En-/disables grid
- **Show Circles:** En-/disables auxiliary circles
- **Show 3D Corpus:** En-/disables objects
- **Show 3D Effects:** En-/-disables Height-depending effects
- **Show Loudspeakers:** En-/disables speaker locations
- **Show Animation-Paths:** En-/-disables paths of recorded movement automations
- **Night Mode:** Activates/Deactivates Night Mode

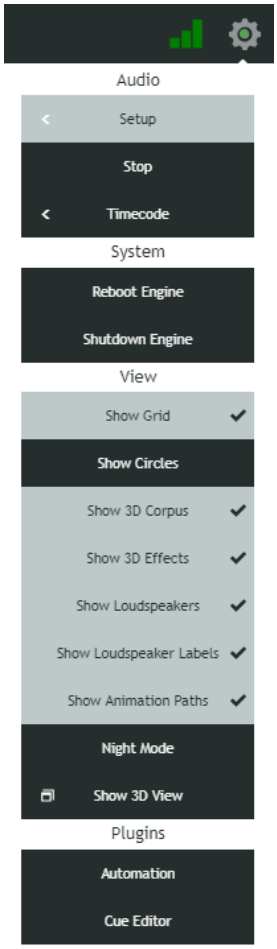


Fig. 32 Settingscontrol

- **Show 3D View:**
  Opens a pop up window with an interactive 3D representation of the room wich can be navigated by “Zooming” and “Drag&Drop”. Like in *Setup Configurator’s* Loudspeaker-Tab, different visual parameters can be altered.

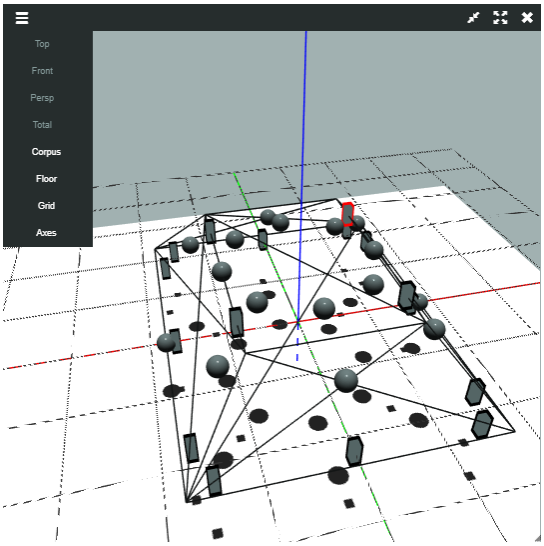
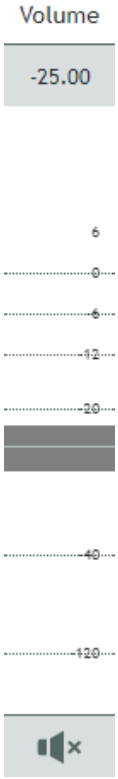


Fig. 33 3D View Window

3.5.2.3 Volume Fader



The master volume fader is located beneath the session management bar and on the left side of the *Sourcestrips*. It enables the user to adjust volume of the *ProductionApp*.
The layout is as follows:

- **Level metering and treble:** Monitors output and provides level adjustment.
- **Volume Mute Button:** Clicking on the speaker symbol mutes or unmutes the volume.

Fig. 34 Volumefader

3.5.2.4 Sourcestrips

The *Sourcestrips* provide the user extensive control of the audio content broadcasted by the DAW. With this tool, the properties of single received channels as a spatial object can be freely altered. The *Sourcestrips* are numbered from 1-32 and, depending on the display size, aligned in one or two rows.

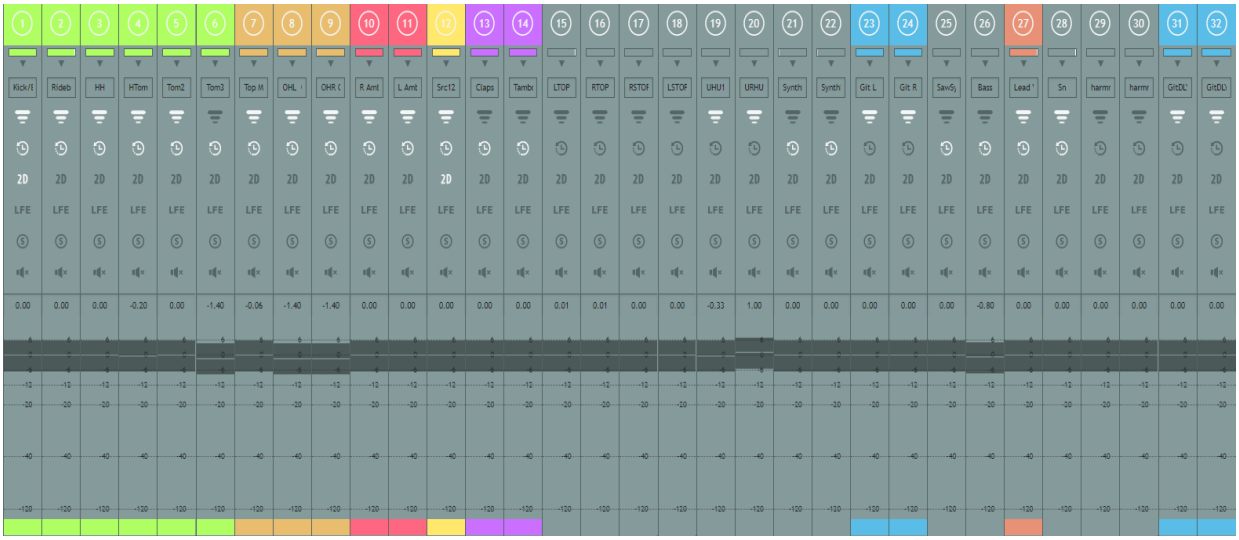


Fig. 35 Active Sourcestrips

Each strip includes the following configurable functions, represented by icons (f. t. t. b.):

- **Index:** The index button is located on the top of a Sourcestrip. Depending on the number of tracks routed to a DAW output channel, one or more tracks are assigned to a virtual sound *Source*. Clicking the button activates the Sourcestrip, which highlights the strip and colors the index white. Upon activation, a respective *Source* appears on the *Source Canvas* (see 3.5.2.6), if deactivated, strip section and *Source* symbol grey out.
- **Colorizer:** Clicking on the colorizer grants access to a pop up menu that enables the user to assign colors on the canvas individually for each *Source*.
- **Source-Tag:** The Source-Tag enables the user to name a Sourcestrip and its respective *Source Canvas* element. When generated, *Sources* are automatically assigned with the name ‚Src'+ ‚<source number>'.
- **Plane Wave/Point Source:** A *Source* can be either synthesized as *point source* or *plane wave*. Upon activating a Sourcestrip, the corresponding *Source* is generated as Point-Source. Point-Sources are characterized as being directional and spotty, which makes them suitable for dynamic or allocable sound events. Triggering the plane wave flag switches the sound emission patterns. Plane waves emit sound widely and are able to reach further regions of the room by using more speakers on different planes. Localization will however decrease and hence the sound will be distributed diffusely. This flag suits especially for extensive soundscapes such as background noises or to simply amplify a *Source* without manipulating the level.

! Plane waves may also be used to enhance surround sound scapes in bigger SSW systems.

Fig. 36 active (5, light grey) and passive (6, dark) Sourcestrips

- **Minimum Delay:** The *Source* is rendered as quickly as possible (without position delay). To move a *Source* without the development of a *Doppler* effect or phasing, the minimum delay flag can be activated.
- **2D:** Switches between 3D (default) and 2D *Sources*. In 2D mode, *Sources* are only movable on horizontal speaker levels.
- **LFE: L**ow **F**requency **E**ffects can be activated to push the low frequencys for special effects.
- **Solo Button:** Triggering toggles this source to solo. All other *Sources* are greyed out on the canvas and won't generate output. If multiple *Sources* are soloed, all of them will generate output.
- **Mute Button:** Mutes the *Source*.
- **Volume Fader:** Monitors output and provides level adjustment of the corresponding *Sourcestrip*. Can also be automatized, when timecode is played and automations are recorded.

Flag overview and use cases:

If a *Sources* movement is automated, *MinDelay* should be set, unless the upcoming Doppler/Phasing effect is desired. Plane or point wave sound radiation is toggled by the *Plane Wave* flag.

To trigger planar instead of 3D movement, *2D* is to be used.

It is also possible to automate the use of *manual Z*-Values for the positions of *Sources* as well as the gain of single *Sources*.

All flags can be set globally by the shortcut <*alt*>+<*flag trigger*>.

Fig. 37 Sourcestrip with activated flags (Plane Wave, Minimum Delay)

3.5.2.5 Source Modifier

The *Source Modifier* specifies the flagging options set in the *Source Strips* and provides additional visual enhancements as well as exact positioning via a coordinats prompt. The *Source Modifier* always represents the focused *Source Strip*. It is composed as following(f.t.t.b.):

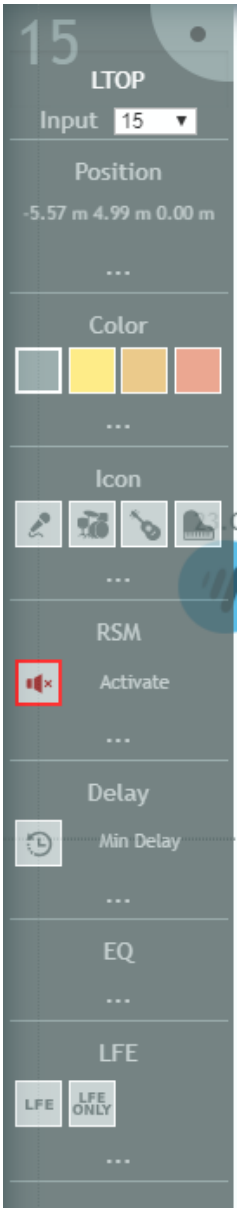


Fig. 38 Source Modifier

- **Index/Source-Tag/Icon:**
  Number of the channel, source tag and icon are shown. In default mode the icon always shows the source type, either *Plane wave* or *Point source.*
- **Input:**
  Dropdown-Menu to choose which Input-Channel the audio data are coming from.
- **Position:**
  The exact coordinates of a source are shown. By clicking on the following up menu, the coordinates of each axis can be entered separately. Additional Buttons allow to trigger 2D Mode, activate manual control of the z coordinate of the source and place the source at the center position.
- **Color Drawer:**
  Standard colors can be picked here**.** By clicking on the following up menu more colors can be chosen.
- **Icon Drawer:**
  Analogue to picking a color, icons can be picked to individualize a source.
- **RSM:**
  Activates Room-Simulation of the source. By clicking on the following up menu the volume can be adjusted via a fader. While *RSM* is active, it is not possible to activate *Delay*, *LFE* or *2D*.
- **Delay:**
  Clicking on the following up menu allows to change the delay properties of a single source between *Min Delay*, *Distance Dependent Delay* or *Distance Dependent Loudness*.
- **EQ:**
  Clicking on the following up menu opens up an 8 banded equalizer with the parameters frequency, Q, filter type and gain. Additionally every band may be toggled on or off by a killswitch.
- **LFE:**

The LFE option shows, wether the deep frequencies of a source are pushed or not. Clicking on the following up menu grants access to a volume fader of the deeper frequencies.

3.5.2.6 Source Canvas

The *Source Canvas* is a 2D top down room representation of the *SSW* speaker setup; sources inside the setup are however synthesized on a 3D envelope corresponding to the configured 3D corpus of the setup. Therefore a centred source is played exclusively by the zenith speaker/speakers (*Voice of God*). Sources with a set 2D flag are synthesized two dimensional.

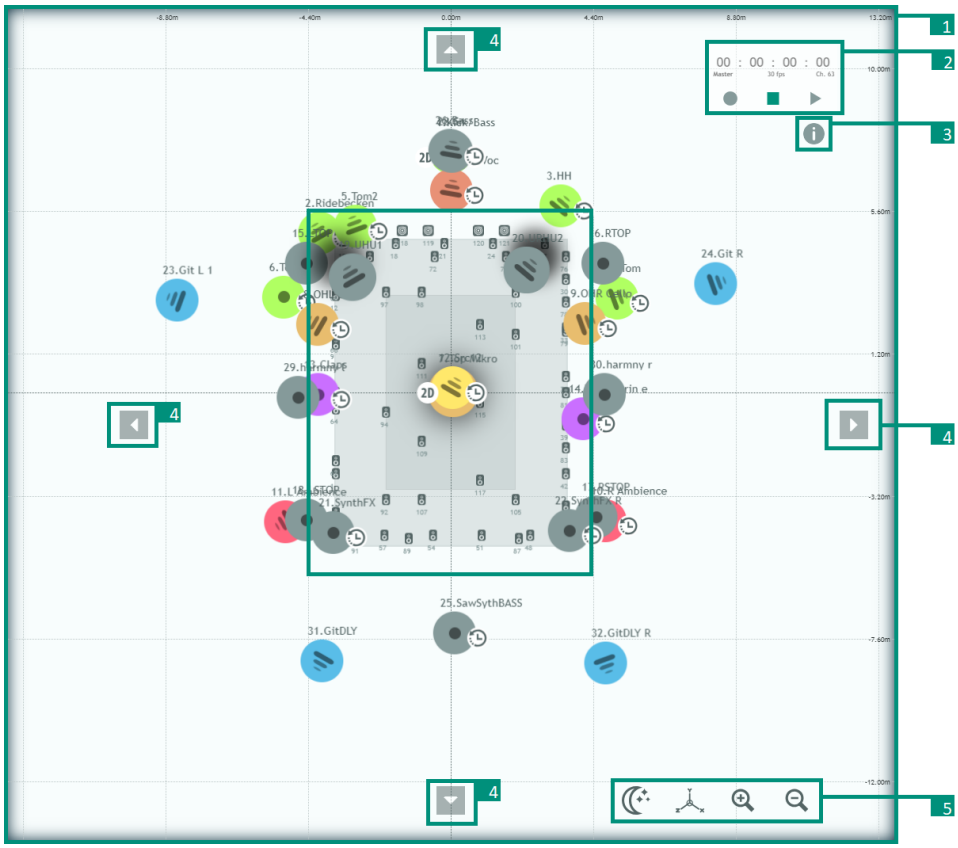


Fig. 39 Source Canvas with placed sources

1. **Canvas-UI:** The Canvas-user-interface corresponds with the *Sourcestrips*. Upon activating a new *Sourcestrip*, the corresponding source appears on the Canvas. Sources can be freely placed and moved by dragging and dropping them on the surface. If Automation recording is activated, Movement-Automations are recorded when a source is dragged. Wrong automations can be easily overwritten or deleted and redone in the *Automation-Manager*. (see 3.6)
2. **Timecode & Timecode-Control:** Shows current Timecode, Timecode-Mode and used Timecode-Channel. Buttons allow to start recording of Automations and starting/stopping of Timecode if Timecode-Mode *Master* is chosen.

3. **Feedback Tracker:** By clicking the latest feedback-messages are displayed. Color indicates which kind of message was sent.
    - **Grey:** no new messages
    - **Green:** Success
    - **Yellow:** Warning
    - **Red:** Error
4. **Canvas Navigation Buttons:** By clicking on one of the Buttons the shown part of *Source Canvas* is moved in the direction of the Arrow on the Button.
5. **Room Visualization:** After successfully integrating *SSW* in a speaker system, the room layout is shown on the *Source Canvas*. In addition, the speaker positions are visible. Each time a signal addresses a speaker, the speaker is highlighted green.
6. **Canvas-Control Buttons:** Buttons to manipulate the Source Canvas, f.l.t.r.:
    - **Night Mode:** use a dark grey instead of a white background for the *Source Canvas*
    - **Reset Origin:** center shown part of the *Source Canvas* on coordinate origin
    - **Zoom In:** changes shown part of the *Source Canvas* so the loudspeaker seem closer
    - **Zoom Out:** changes shown part of the *Source Canvas* so the loudspeaker seem farther away

3.5.3 Use Cases for SpatialSound Productions and the Production App

3.5.3.1 Band

The following example shows the process of a quick SpatialSound production for a band with lead, percussion, guitar, bass, synthesizer and cowbells.

At first, 6 mono tracks and one additional timecode track (*lime)* are created in the DAW (in this case *Steinberg Nuendo*). The channels are routed according to *2.1*.

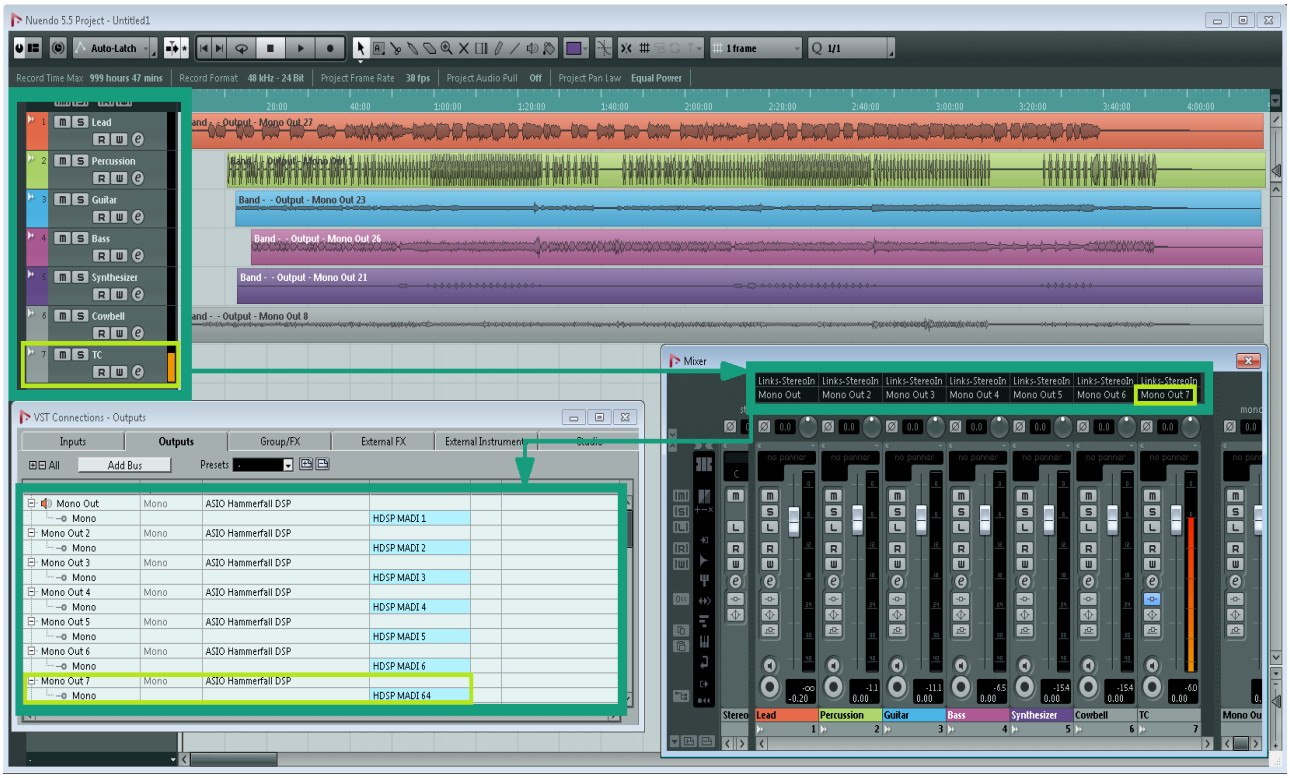


Fig. 40 Steinberg Nuendo with session view, output routing, and mixer routing (cyan)

In the next step, the *Production App* is opened up and a new project with the name “Manual_Bandproject” is created.

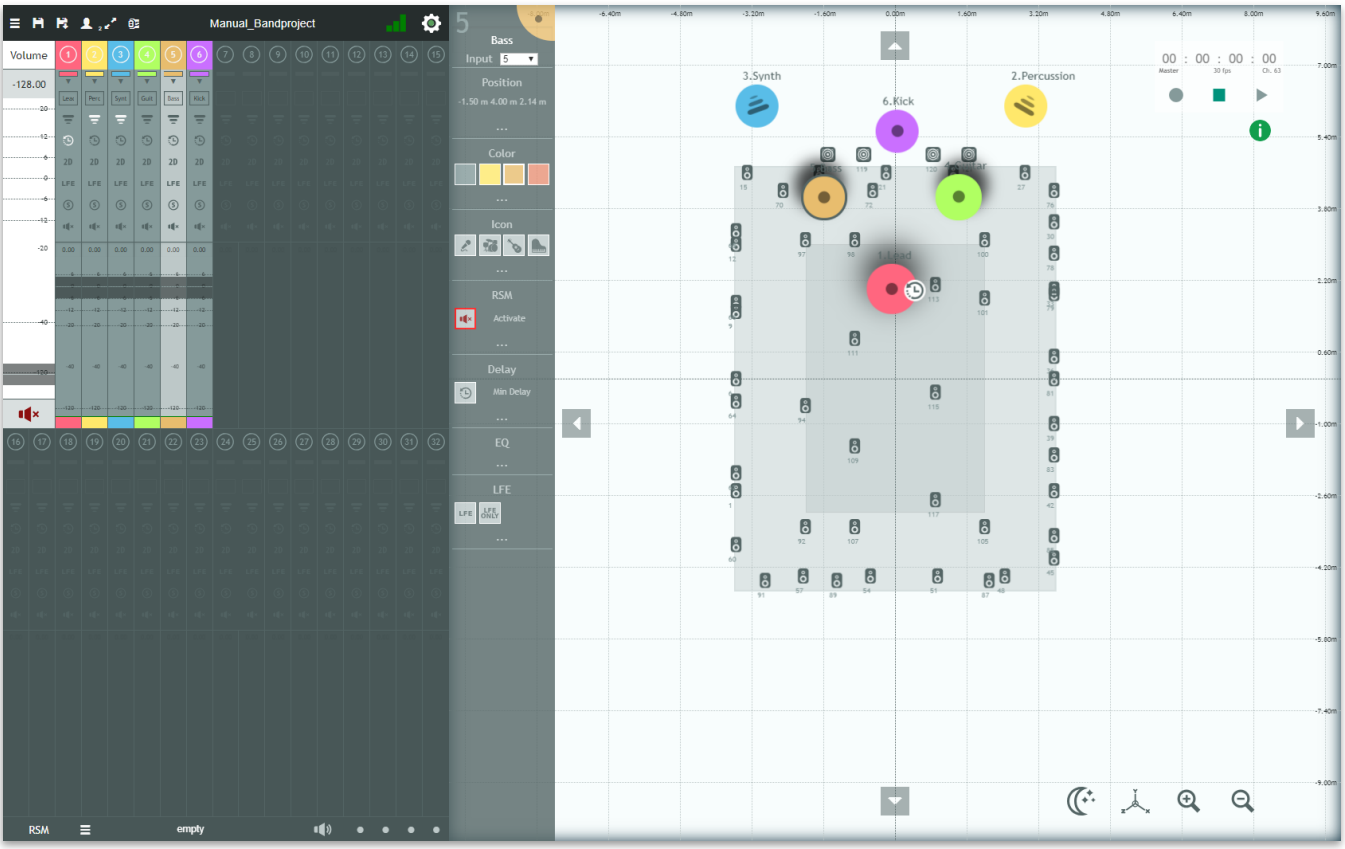


Fig. 41 Source Canvas with sources set in a conventional band setup

The green status symbol (gear) in the upper middle indicates that the renderer is connected and ready. The external timecode as well as the 6 sources are activated and named afterwards. Now, the sources can be placed in a desired constellation on the *Source Canvas*. The percussion is represented by a mono track in this example. To ensure a nevertheless broad sound emission, the plane wave flag is triggered. The synthesizer is treated analogue.

The lead track is equipped with an automation to simulate movement of the vocalist. To prevent phasing/Doppler effects, the MinDelay flag on the lead channel strip is activated. Recording is accomplished upon timecode rendition, activated recording and dragging of the corresponding source symbol. To play the automation, the DAW timecode has to be rewound in an adequate manner.

However, *SpatialSound Wave* does promote more ambitious mixing approaches as well. An alternative production with the same instrumental constellation could be designed entirely different:

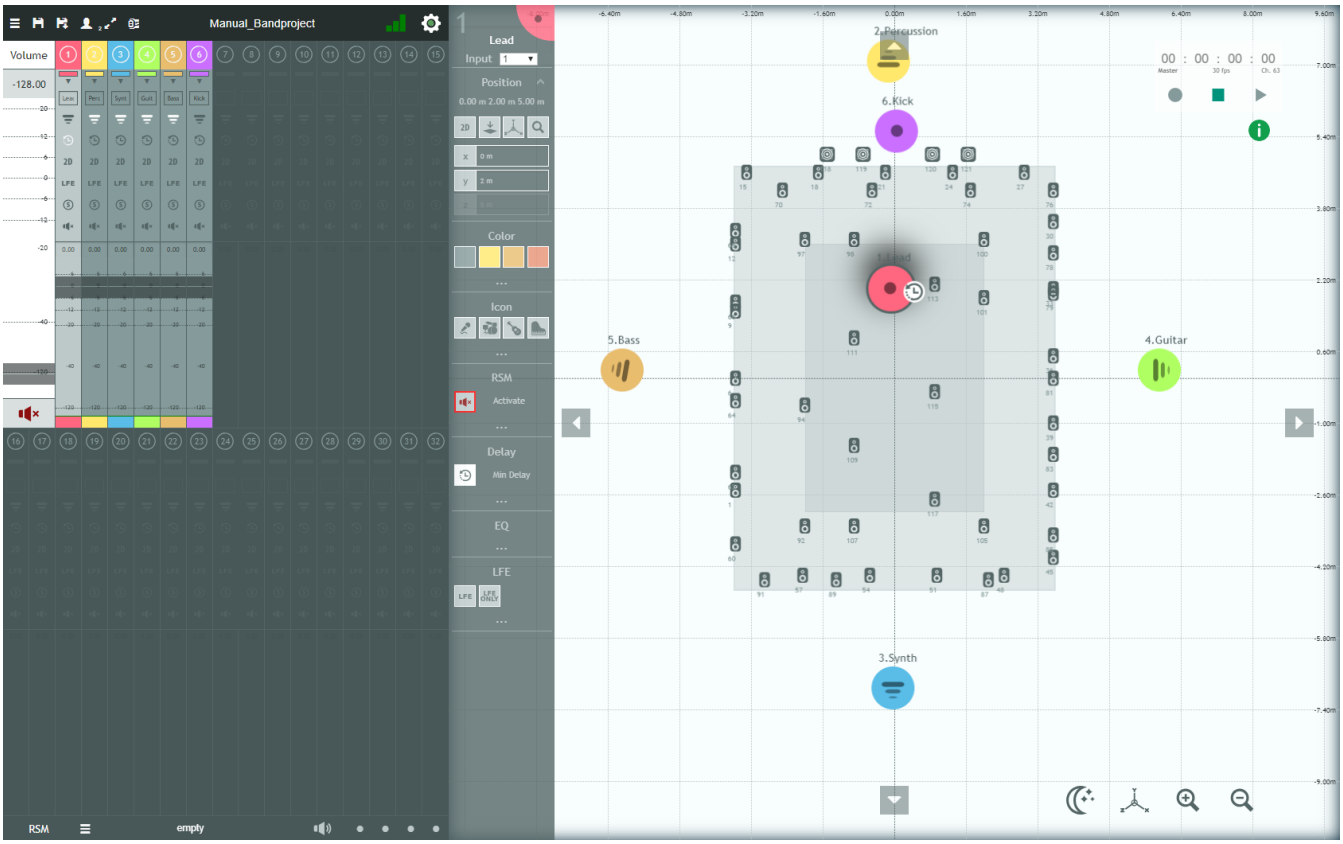


Fig. 42 Source Canvas with sources set in a experimental band Setup

3.5.3.2 Playback of surround mixes

To play surround mixes on a *SSW* system, the master tracks left, center, right, left surround, right surround and sub(*here: 5.1 mix*) are created in the DAW and routed accordingly. After finishing the routing, the 6 DAW mono tracks should correspond to the first 6 *Production App* channel strips.

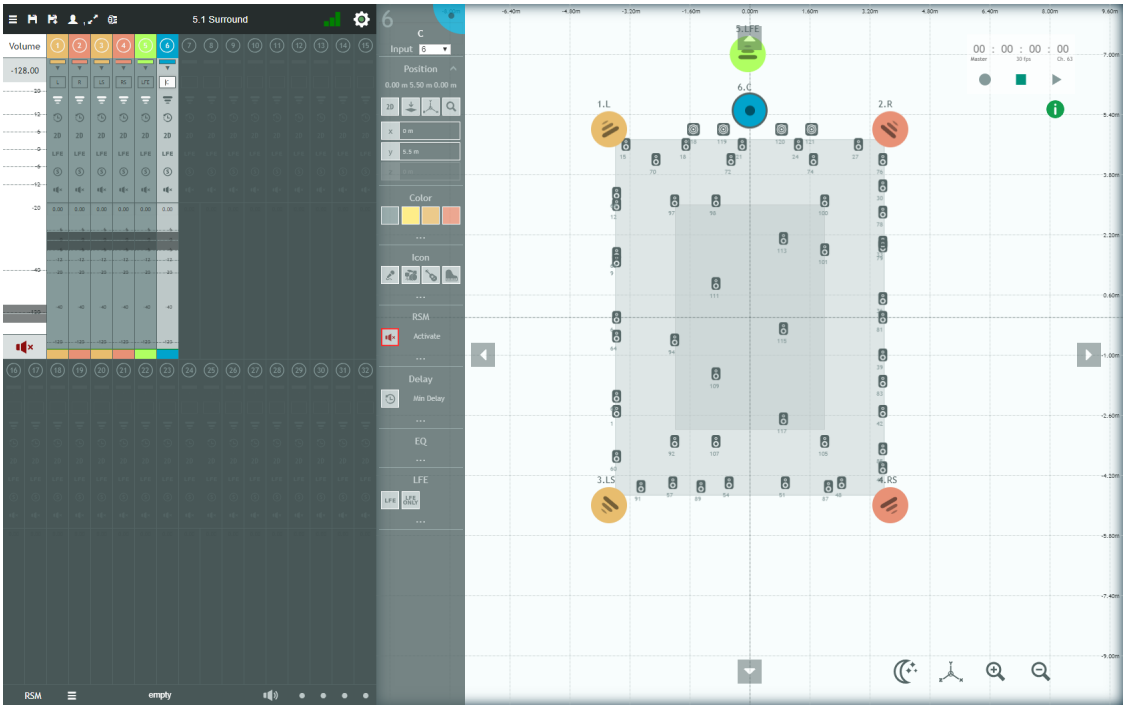


Fig. 43 5.1 Setup with a Point Source as centre, surround speakers and LFE-Channel as Plane

After activating the strips, they are set up according to a conventional 5.1 speaker setup on the *Source Canvas*. This approach works for the transport of any surround setups, entirely independent of physical speaker positions. The Plane Wave flag realizes a broader positioning of a surround setup, whereby greater areas in every direction can be filled with sound. Likewise the bass management can be handled as desired.

3.6 Automation Manager

The *Automation Manager* is the central application to create and manage all automations in your productions. All recorded movements and changes of all audioobjects will be shown here. It's possible to copy, move or delete automationpattern for each track. For every object you can fully automate the movement in all Dimensions (x,y,z), the change of the gainfader and all channel-flags (2D, Planewave and MinDelay).

3.6.1 Full Screen View

The following image shows a general overview of the user interface and its functions.

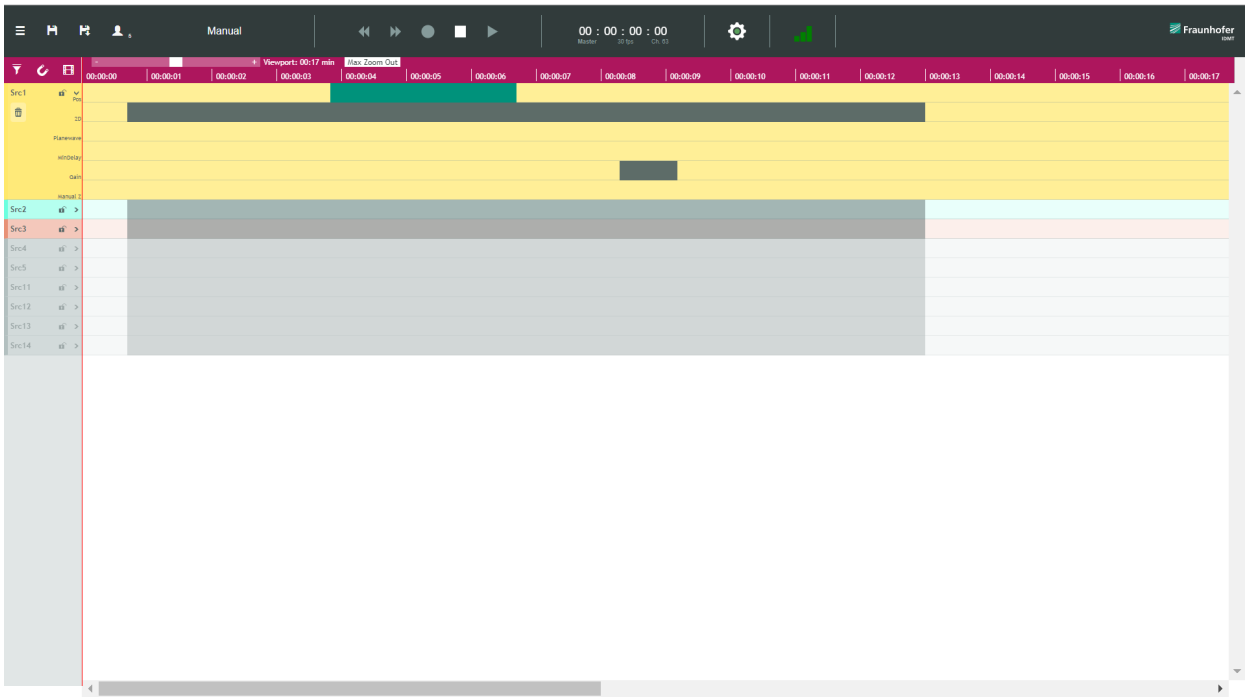


Fig. 44 Automation Manager Full Screen View

3.6.2 User Interface

The following chapter will entirely focus on the elements of the full-screen view.

3.6.2.1 Session Management and Transport Bar

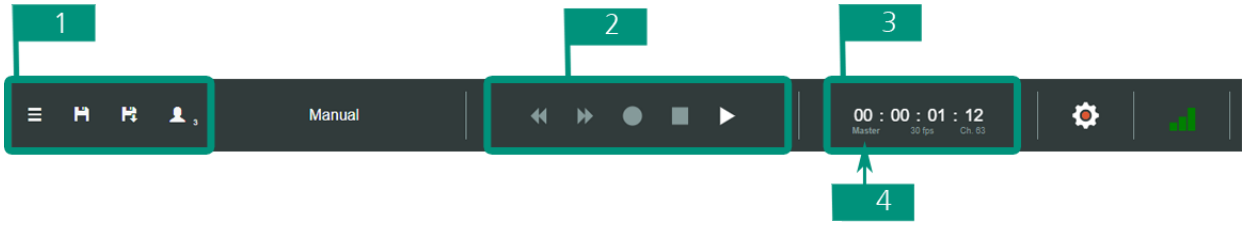


Fig. 45 Automation Manager - Session Management and Transport Bar

The Session Management and Transport Bar in the *Automation App* is identical to other applications and linked with the *Production App*.

1. **Session Management:** Save, load or create new sessions.
2. **Transportsection:** Play, stop, record or navigate trough the production. This section depends on your timecode settings.
3. **Timecodesettings:** Shows all Timecode information (time, selected timecode channel and timecode frame rate). These settings can be changed in the *Configurator App* (see *3.2*). The LTC (SMPTE/EBU) display shows you the position of your timecode in hh:mm:ss:ff.
4. **Master/Slave:** Switches between master and slave. If the master mode is active, the SSW-System uses the own timecode and it's possible to navigate trough the timeline. If slave mode is active, only the record button remains and the rest will be greyed out. Now the external timecode e.g. a DAW controls the timeline of the SSW system (including play and stop).

3.6.2.2 Timeline

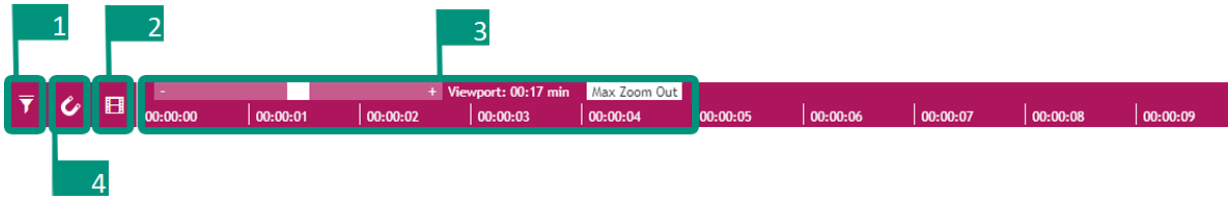


Fig. 46 Automation Manager - Timeline

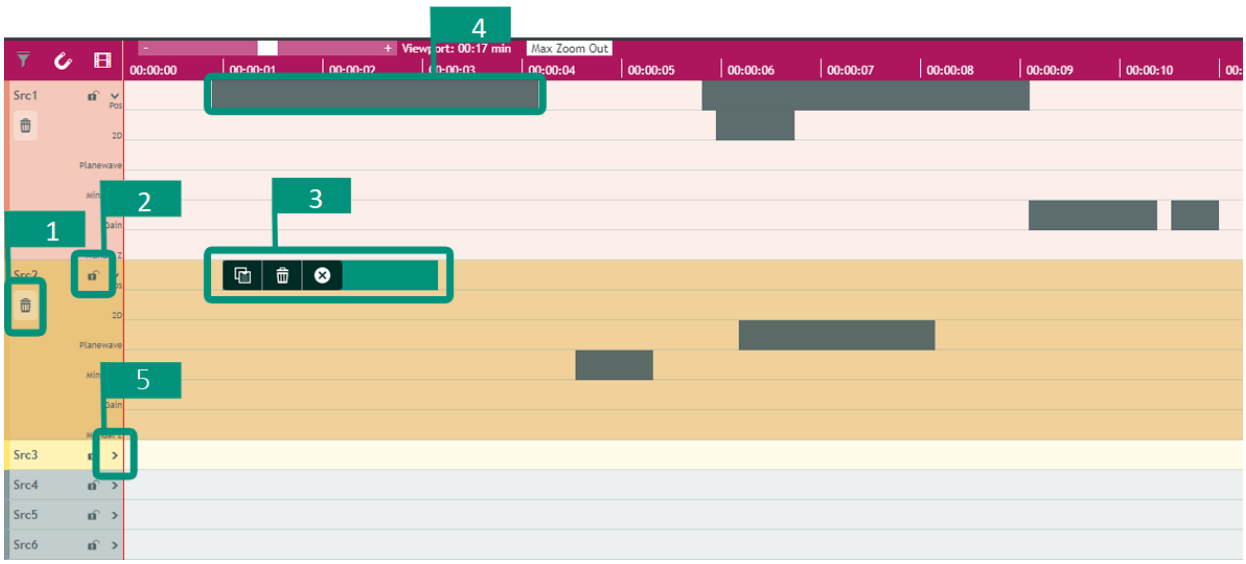
The Timeline shows you the position of your production in hh:mm:ss.

1. **Viewfilter:** Shows or hide tracks without automations.

2. **Snapmode:** Activates/deactivates the snap mode, where a automation pattern snaps automatically to the next nearby pattern.
3. **Autoscroll:** Switches autoscroll mode on or off. When autoscroll mode is activated the viewport will automatically follow the movement of the cursor.
4. **Zoom:** You can use the zoom fader to zoom in and out. Use “Max Zoom Out” for the greatest viewport.

3.6.2.3 Arrangement Window

In the Arrangement window you can see all tracks with *Automations*. All *Automations* are shown as grey patterns (**4**). A selected track is highlighted yellow, whereas a selected Automation pattern is highlighted green. You can move the patterns to change the positions. After clicking on a pattern once with the right mouse button, a small pop up window (**3**) appears. Now you can copy or delete the selected pattern. To copy this to another position, press the copy symbol and a small plus appears on your mouse cursor. Now you can easily copy this pattern to different positions within the same or a different track. To exit the copy mode just close the popup window. You can copy automations for position and gain tracks.



1. **Delete automations:** Remove all automations for a whole track.
2. **Lock track:** When activated, protects tracks from unwanted changes.
5. **Expand trackview:** Minimize or maximize the view of the track.

3.7 Spatial Live! App

Spatial Live! is a slimmed down version of the *Production App*. *Live!* inherits many *Production App* functions, but its core design aims at an intuitive workflow and spontaneity. Sources can be placed quicker and sessions can be loaded faster. The application synergizes with mobile devices or tablets. Every *Production App* based session is accessible by *Live!*, even during a *Production App*s can be switched easily.

! *Unlike the Production App, Spatial Live! receives only external timecode and is in a stationary slave function.*

3.7.1 Full Screen View

The full screen view reveals several similarities to the *Production App* (see 3.5).

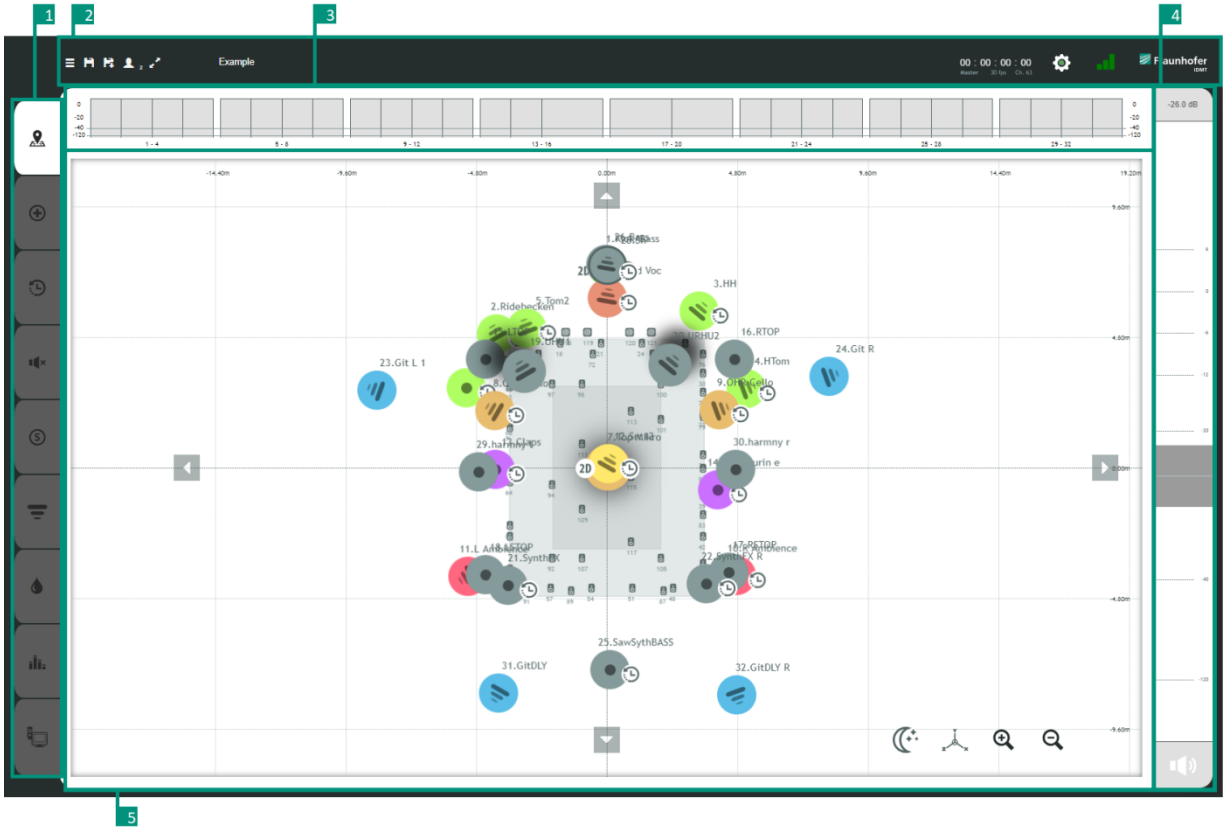


Fig. 47 Full screen view showing opened up Positioning Tab with set sources

1. **Tab bar:** Upon triggering single tabs, access to different functions and status matrices is granted.
2. **Session management bar:** Session management grants complete access to .uifm file management, rendering unit status and other versatile global functions for surround sound manipulation (compare to *Production App*). In addition the current timecode and timecode control elements are displayed.
3. **Output-Metering:** Constant monitoring of the output channels of active *Sourcestrips*.
4. **Volume Fader:** The volume fader enables the user a continuous volume monitoring and adjustment.
5. **Source Canvas:** The *Source Canvas* provides a freely scalable top-down room layout and enables the user the graphical positioning of *Sources* which are defined by their respective *Sourcestrip*. Both static and dynamic *Sources* are realizable.

3.7.2 User Interface

The following chapter will entirely focus on the elements of the full-screen view:

3.7.2.1 Global features

All global features are shown in Fig. 47 and known from the *Production App (see 3.5)*:

1. **Session-Management-Bar:** *(*see *3.5.1)*
   Exception: Timecode is drawn externally.
2. **Output-Metering:** Output channels of all active sources are metered.
3. **Volume Fader:** The volume fader enables the user a continuous volume monitoring and adjustment.

3.7.2.2 Tab Bar

The tab bar grants access to any function of the *Live! App*. All functions are triggered by clicking on/touching the single tabs, the symbol of the active tab is highlighted white (f.t.t.b):

- **Positioning Tab:**
  The *Positioning Tab* corresponds to the functions of the *Source Canvas* of the *Production App* (see *3.5.1*).

Fig. 48 Positioning Tab

- **Creation Tab:**
  Opens up a matrix; by clicking/touching the featured 64 plus icons new *Sources* can be added. Comparable to the index button of the *Sourcestrip* (see *3.5.2.4*).

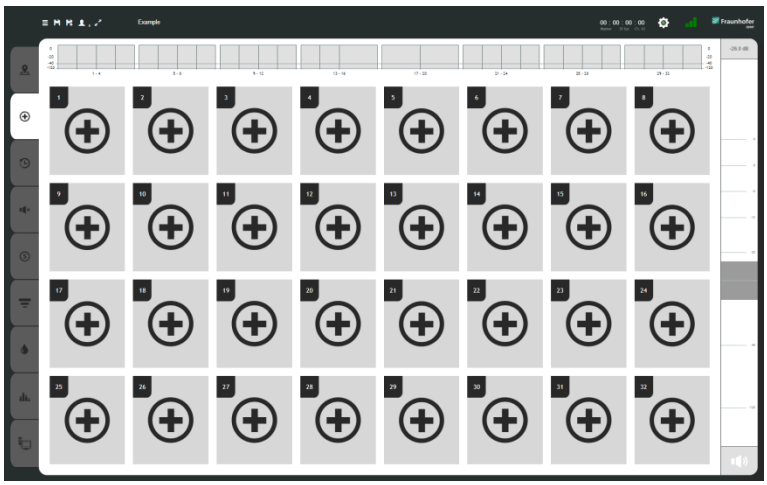


Fig. 49 Creation Tab

- **Delay Optimizer:** Toggles minimum delay for single *Sources* (see *3.5.2.4*)

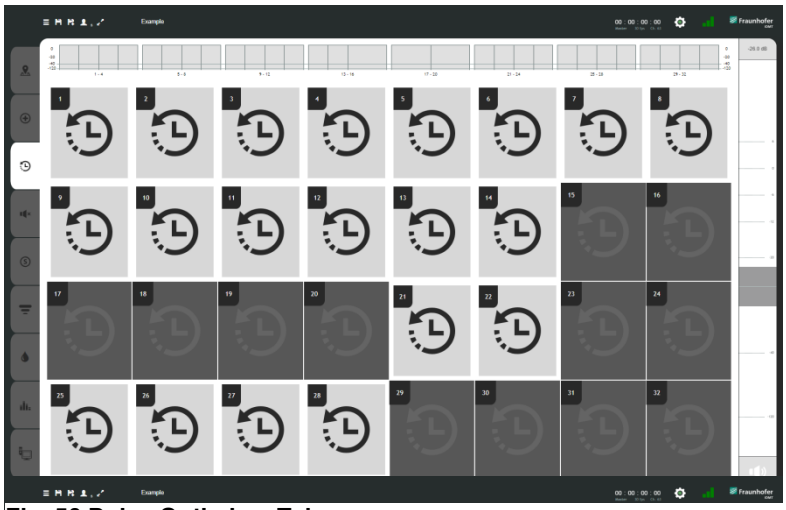


Fig. 50 Delay Optimizer Tab

- **Mute Matrix:** Opens up a matrix; by clicking on/touching the featured speaker icons, single *Sources* are muted/unmuted (see *3.5.2.4*).

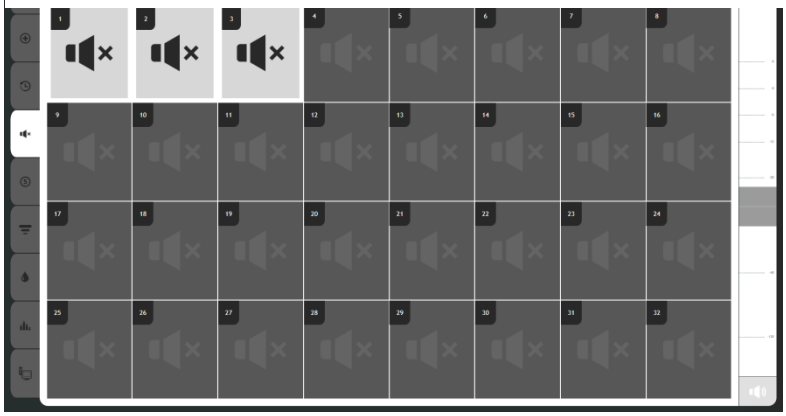


Fig. 51 Mute Matrix Tab

- **Solo Tab:**
  Opens up a matrix, by click on/touching the featured speaker icons the *Solo*-modus of a single *Source* can be toggled on/off.

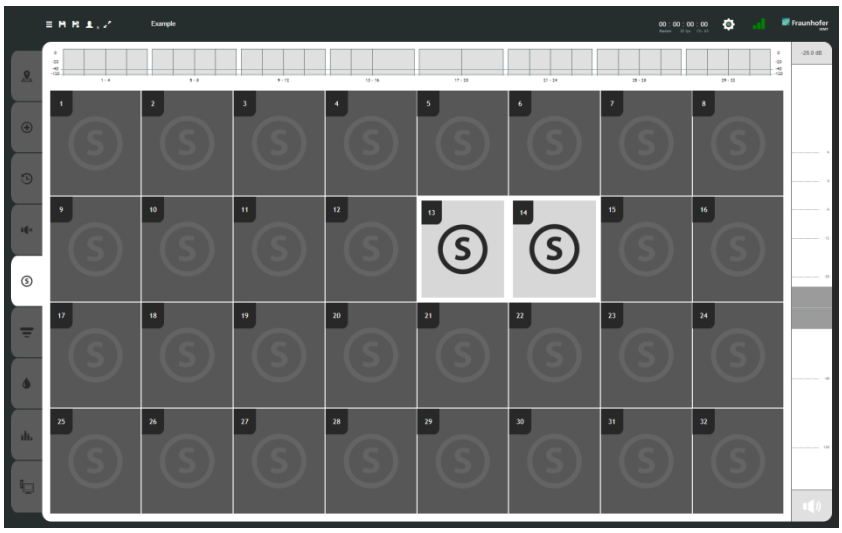


Fig. 52 Solo Matrix Tab

- **Source Type:**
  Opens up a matrix; by clicking on/touching the featured 32 speaker icons, the sound emission characteristics of single sources are switched between *Point Source* and *Plane Wave* (see

  3.5.2.4).

Fig. 53 Source Type Matrix

- **RSM Tab:**
  Comparable to the *Production App* feature, RSM can be toggled for the first 16 sources (see *3.5.2.4*).

Fig. 54 RSM Matrix Tab

- **Metering Tab:**
  Grants quick and intuitive access to input and output monitoring of every channel.

Fig. 55 Metering Tab

- **Remote Tab:**
  Grants access to communicate with OSC interfaced programs like *Reaper* or *QLab*.

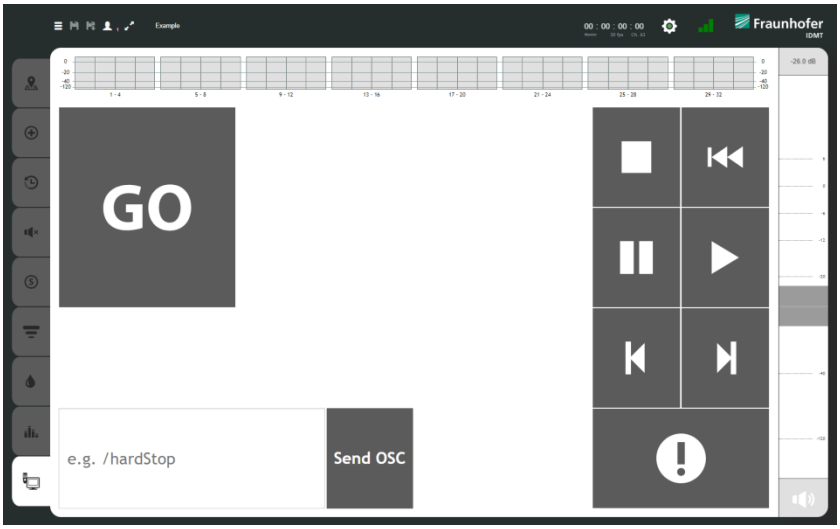


Fig. 56 Remote Tab

3.8 SFF Generator

3.8.1 Folder Selection:

1. **Folder-Management:**
   Buttons (f.l.t.r.) to:
   - move to previous directory
   - refresh File-Browser
   - return to Home-directory
   - create a new directory
2. **File-Browser:**
   Lists audiofiles in current directory. Allows deleting of uploaded files by clicking the Trashbin-Button.
3. **Sff Generator Tabs:**
   Guides through Generation of SFF-File.
4. **File Upload:**
   Either Drag&Drop audiofiles here to upload them or click on the button to open a new window to select which file should be uploaded.

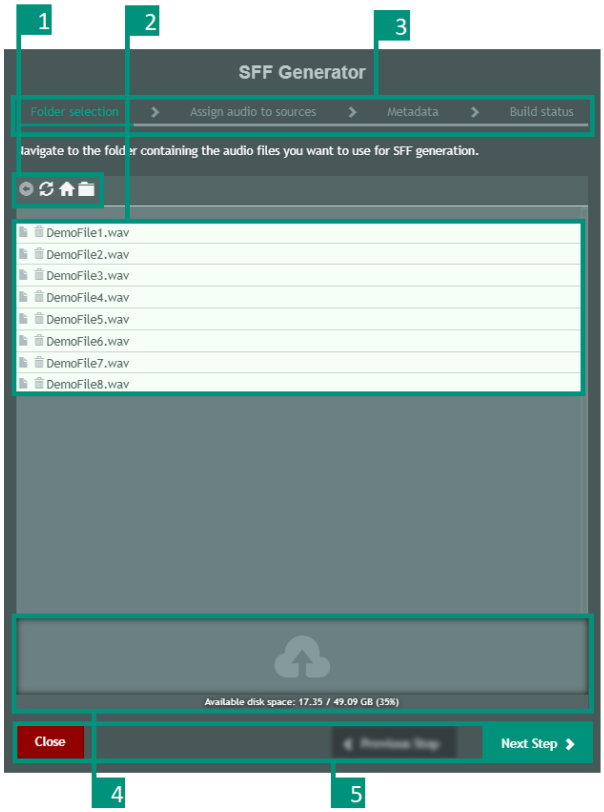


Fig. 57 Sff Generator - Folder Selection Tab

5. **Navigation Buttons:**
   Allows navigation through the Sff-Generation-Process or canceling it.

! Audio files **must** be mono and have a samplerate of 48 kHz.

3.8.2 Audio Assignment:

1. **Source & File-Browser:**
   Allows assigning of audio-files to certain Sources.

! All used files **must** have the same length.

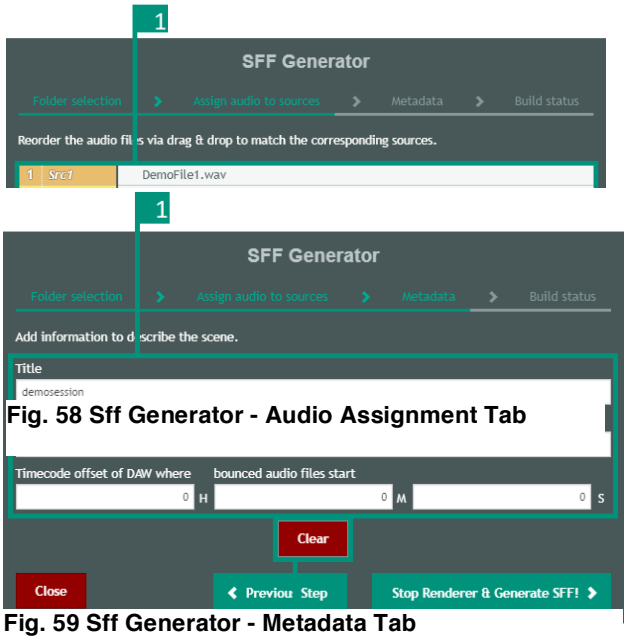


Fig. 58 Sff Generator - Audio Assignment Tab

Fig. 59 Sff Generator - Metadata Tab

3.8.3 Metadata:

1. **Metadata Prompts:**
   Input fields to enter Metadata into.
   Timecode offset makrs starting point of Timecode in Sff-File.
   e.g.: Session contains automation at 01:00:05 (HH:MM:SS) and should be played 5 seconds after starting the SFF-File. Timecode-Offset = 1H
2. **Clear-Button:**
   Clears all input fields.

3.8.4 Generation:

1. **Metadata:**
   Displays written Metadata of the new generated *Sff-File*.
2. **Generation Status:**
   Shows progress of individual steps of generating the *SFF-File*.

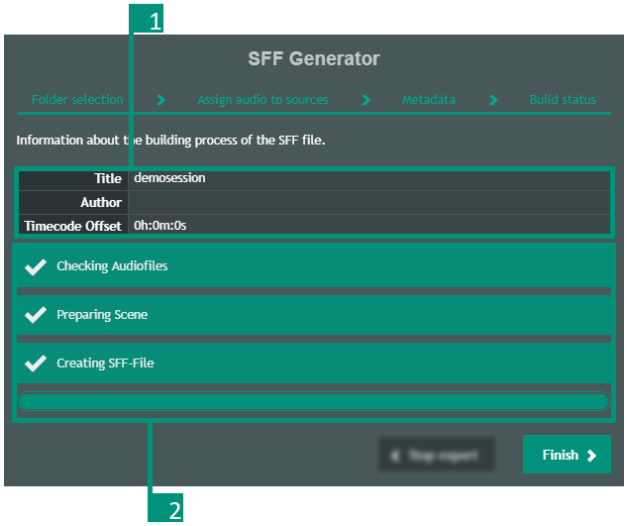


Fig. 60 Sff Generator - Generation Tab

3.9 Sff Player

The *Sff-Player* offers access to the *Sff-Files* on the *Rendering Unit* and allows the creation of *Playlists* consisting of these *Sff-Files*.

3.9.1 Full Screen View

The following image shows a general overview of the user interface and its functions.

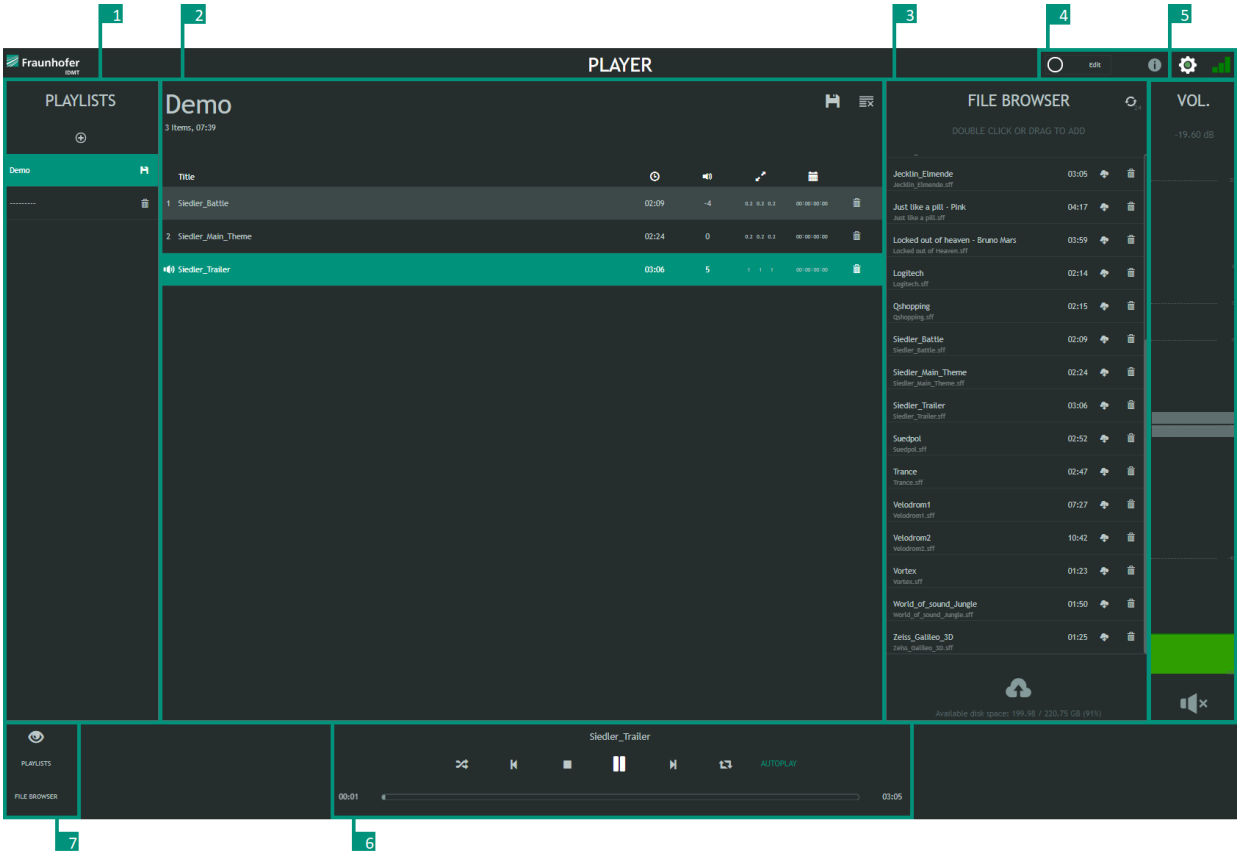


Fig. 61 Fullscreen View of the SffPlayer

1. **Playlist Browser:** Allows creation, loading, saving and deletion of new playlists.
2. **Playlist View:** Shows currently selected Playlist. Allows configuration (scaling, gain, order,Timecode-Offset) of each playlist-element.
3. **Sff File Browser:** Shows available Sff-Files. Allows up/download as well as deletion of Sff-Files.
4. **View Switch & Settingscontrol:** Button to switch between View-Modes. Settingscontrol-Menu.

5. **Volume Fader:** Volume monitoring and adjustment of *Sff-Player*.
6. **Player controls:** Buttons to control currently playing *Sff-File* and toggling Shuffle and Autoplay-Modes on/off.
7. **View Options:** Buttons to manipulate, which parts of the interface should be shown/hidden.

3.9.2 User Interface

The following chapter will entirely focus on the elements of the full-screen view:

3.9.2.1 Playlist Browser

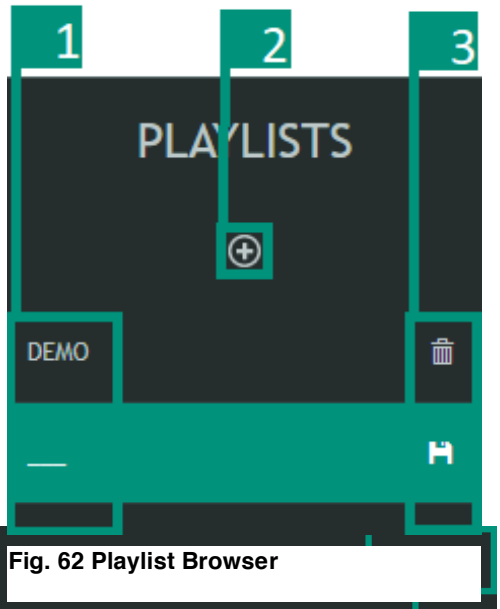


Fig. 62 Playlist Browser

1. **Playlists:**
   Representation of all currently created Playlists. Each playlist can be loaded by clicking on it.
2. **Create Playlist Button:**
   Creates a new playlist. After clicking on it a prompt for the name of the to be created playlist is shown.
3. **Playlist Manipulation:**
   Buttons to manipulate the existing playlists. Only the currently loaded playlist can be saved, the other playlists can be deleted.

3.9.2.2 Playlist View

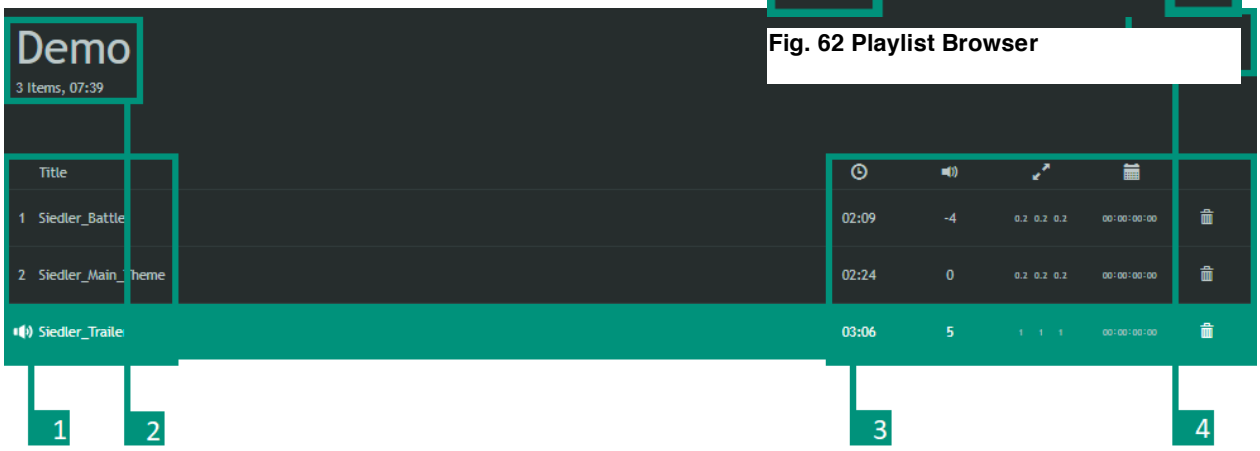


Fig. 63 Playlist View

1. **Playlist Elements:** Lists all elements of the playlist. Currently playing element is highlighted green.
2. **Playlist Information**: Depicts name, number of elements and duration of the playlist.

3. **Element Information & Manipulation:** F.l.t.r.:
    - Shows duration of each element of the playlist.
    - Allows manipulation of gain and scaling of the element.
    - Setting the Offset, which will be applied to sent Timecode (if Timecode-Generation is activated).
    - Removes Track from the playlist.
4. **Playlist Manipulation:** F.l.t.r.:
    - Save the current playlist.
    - Remove all elements from the current playlist.

3.9.2.3 Sff File Browser

1. **Refresh Button:**
   After clicking on it, the rendering unit is scanned for *Sff-Files*.
2. **Sff-File-List:**
   Depicts all on the rendering unit found *Sff-Files* as well as their duration. Also allows downloading (via Cloud-Button) or deletion (via Trashbin-Button) of the files.
3. **Sff-File Upload:**
   Allows upload of *Sff-Files*. Either by clicking on the cloud button and using the appearing File-Browser, or by moving a *Sff-File* via drag&drop to the Upload-Area.

! It is advised to use the Refresh-Button after uploading new *Sff-Files*.

Fig. 64 Sff File Browser

3.9.2.4 View Switch & Settingscontrol

It is possible to alternate between *Edit* and *Playback-Mode* of the *SffPlayer*. This can be achieved via the *View-Switch*.

The *Settingscontrol* works similar to the one of the *Production App* (see 3.5.2.1).

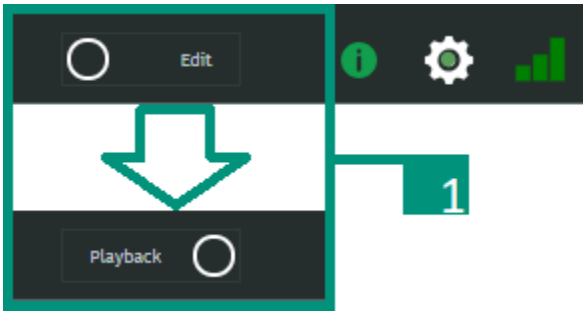


Fig. 65 Edit and Playback Switch

3.9.2.5 Edit & Playback-View

The *Edit-View* of the *SffPlayer* is the one pictured above (*Fig. 61*) and is used to create and configure playlists.

The *Playback-View* offers a more detailed depiction of the Sources in 2D or 3D of the currently played Sff-File.

1. **Playlist Elements:**
   Shows and allows manipulation of elements of the currently loaded Playlist.
2. **2D & 3D Buttons:**
   Allows to switch between 2D and 3D-View of the sources.

2D-View:

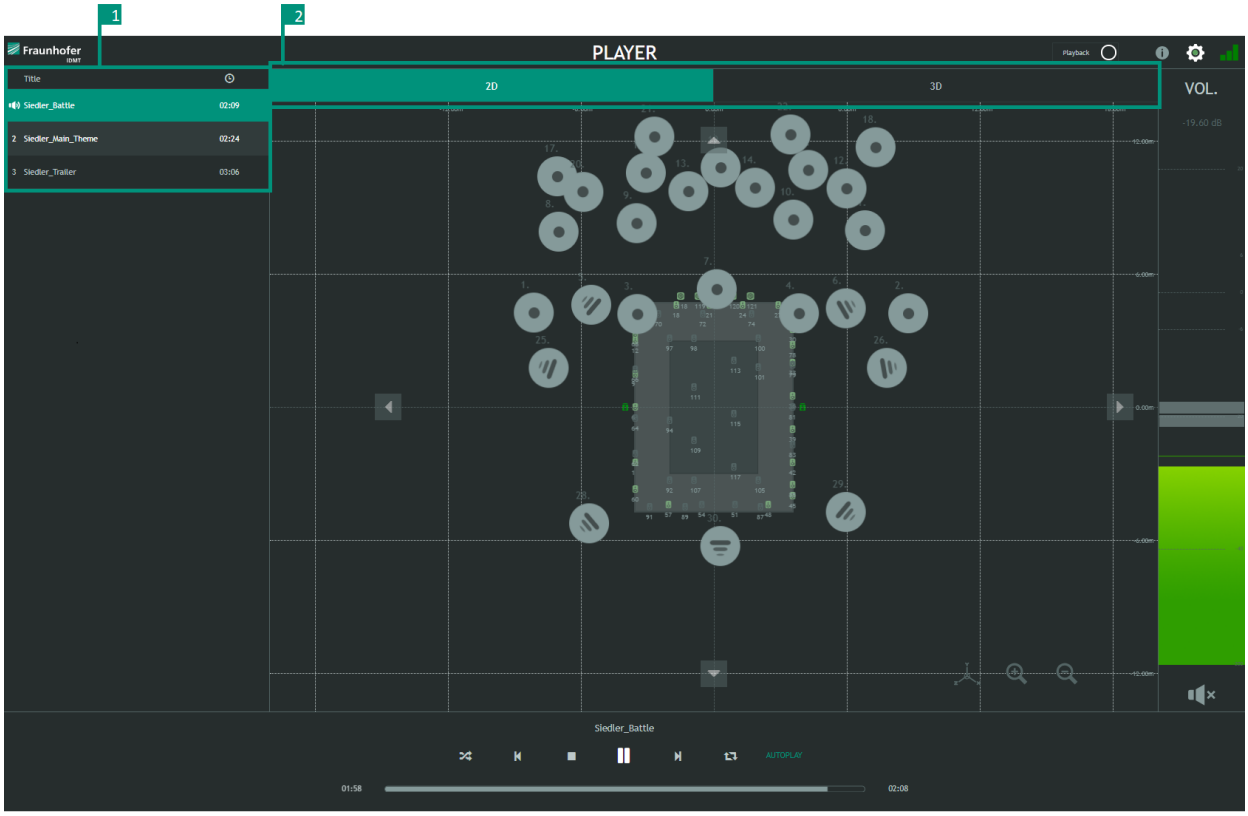


Fig. 66 2D View of the Sff Player

3D-View:

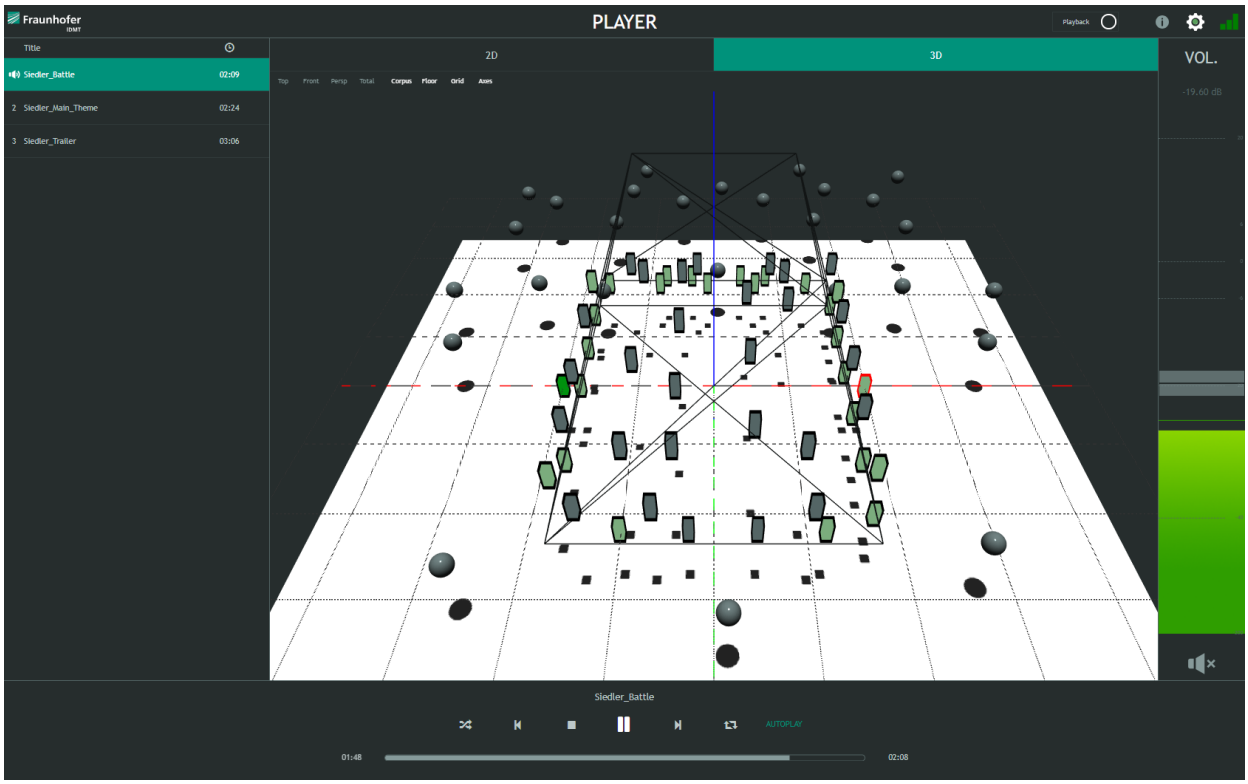


Fig. 67 3D View of the Sff Player

3.10 Cue Editor

The Cue Editor is a tool to create, configure and organize Movement-Patterns of sources.

3.10.1 Full Screen View

The Full Screen View reveals some similarities to the *Production App (see 3.5).*

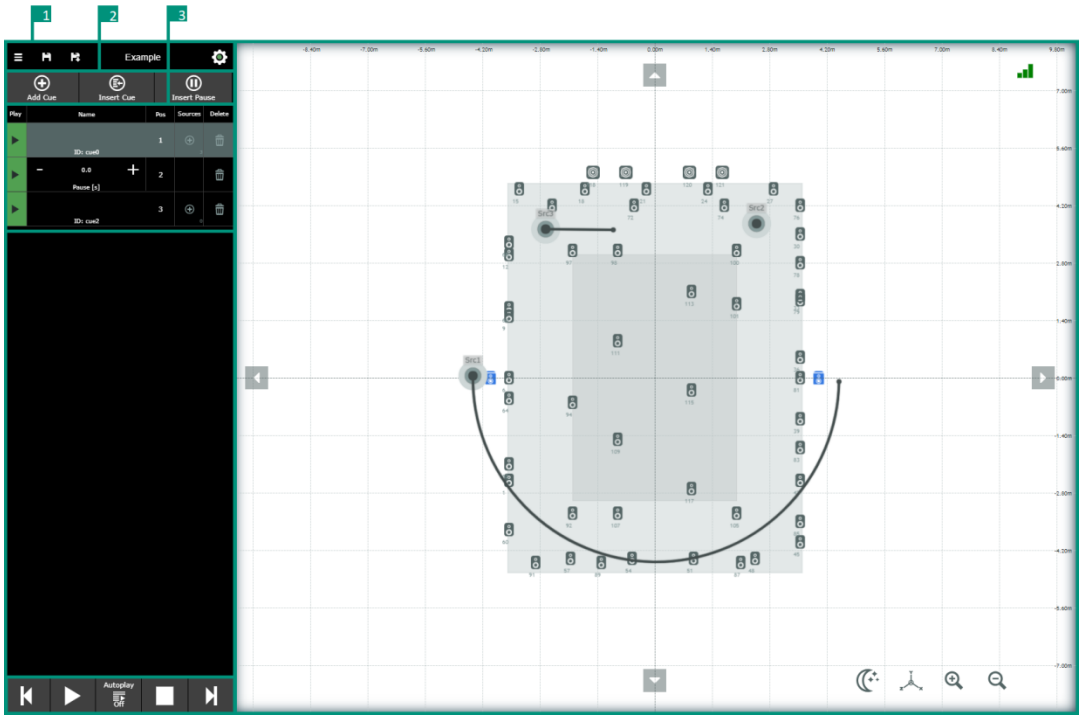


Fig. 68 Cue Editor Full Screen View

1. **Session Management & Settingscontrol:**
   Allows creation and loading of *Sessions* as well as starting/stopping the *Renderer*.
2. **Element Addition:**
   Offers buttons to add *Cues* and Pauses to the *Cue List.*
3. **Cue List:**
   Shows and allows manipulation of current *Cue-Elements*.
4. **Play Control:**
   Buttons to control the playback of the elements of the *Cue List*.
5. **Canvas:**
   Representation of used *Sources* and their paths in the selected Cue.

3.10.2 User Interface

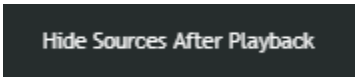
The following chapter will entirely focus on the elements of the full-screen view:

3.10.2.1 Session Management & Settingscontrol

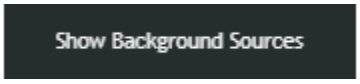
The SessionManagement and Settingscontrol work in a similar way to the *SessionManagement* and *Settingscontrol* in the *ProductionApp (see 3.5)*.

Fig. 69 Session Managament Bar

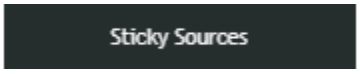
The *Settingscontrol* offers additional Options:



When activated, all *Sources* will be deactivated after the *Cue* was played. Otherwise the *Sources* will stay active on the position it's *Cue-Movement* ended.



When activated, *Sources* which are active but not used in the current *Cue* will appear light grey on the *Canvas*. Otherwise only *Sources* which are used in the current *Cue* are shown.



When activated, *Sources* will be automatically moved to the starting point of its *Cue-Movement*, while editing the *Cue*. Otherwise the *Source* position of the *ProductionApp* and the starting point of the *Cue-Movement* can differ.

3.10.2.2 Element Addition

Fig. 70 Cue Editor - Element Addition

Add Cue: Adds a *Cue* at the end of the *Cue List*.

Insert Cue: Adds a *Cue* at the currently selected position of the *Cue List*.

Insert Pause: Adds a *Pause* at the currently selected position of the *Cue List*.

3.10.2.3 Cue List

The *Cue List* contains the generated *Cues* of the current *Session* and allows configuration of those *Cues*.

1. **Play/Pause:** Allows playing and pausing of a *Cue*.
2. **Name:** Allows naming of a *Cue*.
3. **Position:** Allows to manipulate the order of C*ues/Pauses*.
4. **Deletion:** Allows deletion of the *Cue/Pause*.
5. **Start Time:** Note: Will only be shown if *Autoplay* is activated.
6. **Pause Duration:** Shows duration of the *Pause* in seconds and allows manipulation via "**+**" and "**-**" buttons or editing the value by double-clicking it.
7. **Source Activation:** On click, opens a menu to select and activate *Sources* for the *Cue*.(see *3.10.3*)

Fig. 71 Cue Editor - Cue List

3.10.2.4 Play Control

Play Control offers buttons to manipulate the playback of *Cues*.

F.l.t.r.:

- **Play Previous Cue:** Selects and plays the previous *Cue*.
- **Play/Pause:** Starts/Pauses playing of the currently selected *Cue*.
- **Toggle Autoplay:** Activates/Deactivates automatic playing of the next *Cue* after the current *Cue* finishes.
- **Stop:** Stops playing of the currently selected *Cue*.
- **Play Next Cue:** Selects and plays the next *Cue*.

Fig. 72 Cue Editor - Play Control

3.10.2.5 Canvas

The *Canvas* shows the Paths and current position of the *Sources* of the different *Cues*. It is possible to edit the paths via Drag & Drop in different ways, depending on the kind of movement of the *Source*. If “Show Background Sources” is activated (see *3.10.2.1*), other *Sources*, which are not used in the current *Cue* but are activated in the *Production App*, are shown as well.

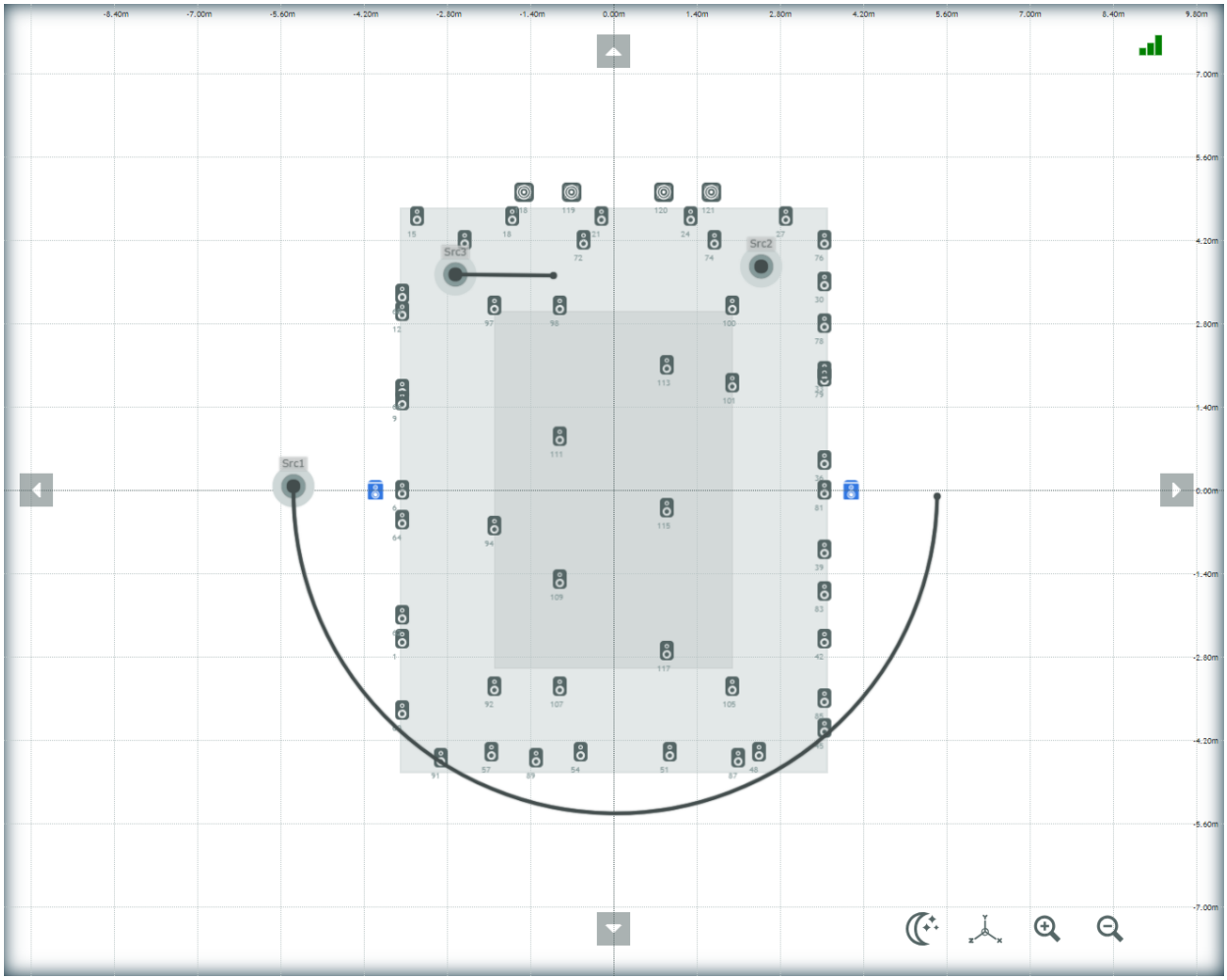


Fig. 73 Cue Editor Canvas

3.10.3 Creating and Editing Cues

3.10.3.1 Choosing Sources

After adding a *Cue* (see *3.10.2.2*) select the *Cue* and click on the *Source Selection-Icon* to see the *Source Selection* of the Cue.

Fig. 74 Source Selection Icon

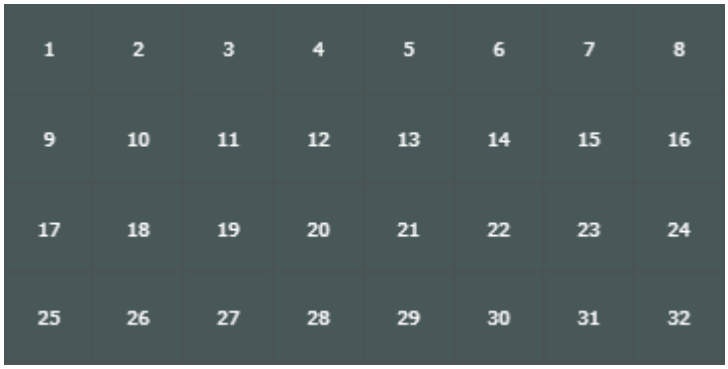


Fig. 75 Cue Editor Source Selection

With the *Source Selection* you can choose which *Source/s* should be used in this *Cue*. A *Cue* can contain up to 32 *Sources* simultaneously.

3.10.3.2 Modifying Cues

For each *Source* in a *Cue*, different parameters can be modified. These parameter contain:

start and end-coordinates, type, duration, delay before starting the movement

These parameters can be modified with the *Cue-Menu*. The *Cue-Menu* can be opened by clicking on a *Source* in the *Source Selection*.

Fig. 76 Cue Editor - Movement Menu

1. **Source Name:**
   Displays name of the selected *Source*.
2. **Movement / Gain Switch:**
   Toggle between Movement and Gain Menu.
3. **Type Selection:**
   Allows to determine type of *Movement* f.l.t.r:
   - **Line:**
     straight line between start and end point
   - **Curved:**
     curved movement between start and end point (circles are possible too)
   - **Jump To:**
     only Z-coordinate (height) of the source will change
4. **Start Position:**
   On click moves the start point if this *Cue-Movement* to the end point of this *Source* from the previous *Cue*.
5. **Duration:**
   Manipulation of seconds, which the *Source* will take to get from the start point to the end point.
6. **Start after:**
   Manipulation of seconds elapsed, before the *Movement* will start.
7. **Start Z:**
   Manipulation of *Z-coordinate* from which the *Movement* will begin.
8. **End Z:**
   Manipulation of *Z-coordinate* at which the *Movement* will end.
9. **Delete:**
   Remove the *Source* from the Cue.

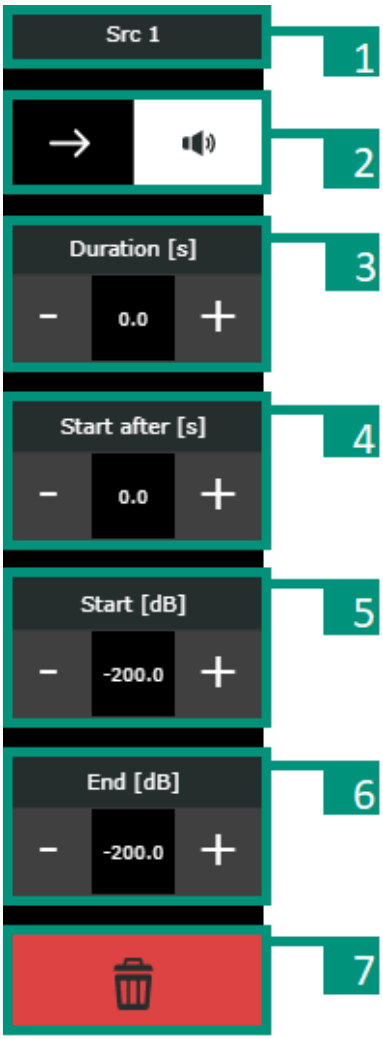


Fig. 77 Cue Editor - Gain Menu

1. **Source Name:**
   Displays name of the selected *Source*.
2. **Movement / Gain Switch:**
   Toggle between Movement and Gain Menu.
3. **Duration:**
   Manipulation of seconds, which the *Gain* will take to get from it's start value to the end value.
4. **Start after:**
   Manipulation of seconds elapsed, before the *Gain* alteration will start.
5. **Start db:**
   Manipulation of *Gain* which the *Source* will have at the start of the Cue.
6. **End db:**
   Manipulation of *Gain* which the *Source* will have at the end of the *Cue*.
7. **Delete:**
   Remove the *Source* from the Cue.

3.11 Administration App

The *Administration App* provides Information about the Rendering Unit as well as multiple administrative functions, like generating and restoring backups or changing the IP-Address of the Rendering Unit.

3.11.1 System

It is possible to obtain information regarding the hardware as well as the software from the first section of the *Administration App*. To get more detailed information on CPU, the configuration of the network interfaces and the soundcard/s of the rendering unit, click the corresponding arrow to expand the information section.

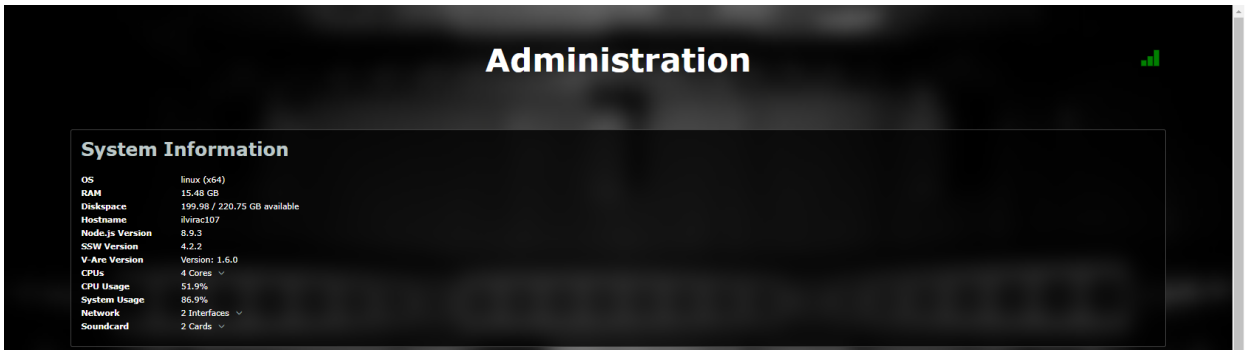


Fig. 78 Administration App - System Information

3.11.2 License Information

The next section contains information about the license-status of the different parts of the SSW-Software.

Fig. 79 Administration App - License Information

3.11.3 Network Configuration

With the NetworkConfiguration it is possible to configure the properties of all network interfaces of the rendering unit.

After choosing one of the network interfaces, you have to determine how the interface acquires its IP, either you assign a static IP, or it will be acquired via DHCP. If you choose to assign a static IP you can configure the used Subnet Mask, DNS-Server and Gateway as well.

! Be aware that if you change the IP-Address of the network interface used to connect to the GUI, you will have to use the new IP-Address to reconnect to the GUI.

Fig. 80 Administration App - Network Configuration

3.11.4 System Backup

It is possible to create, download, upload, restore or delete backups with the corresponding buttons of the System Backup Section.

To select which backup will be affected by the chosen action, the backup has to be selected with the Drop-Down Menu.

Backups contain: *Sessions*, *Setups*, *Cues*, *RSM-Presets* and *Sff-Playlists*.

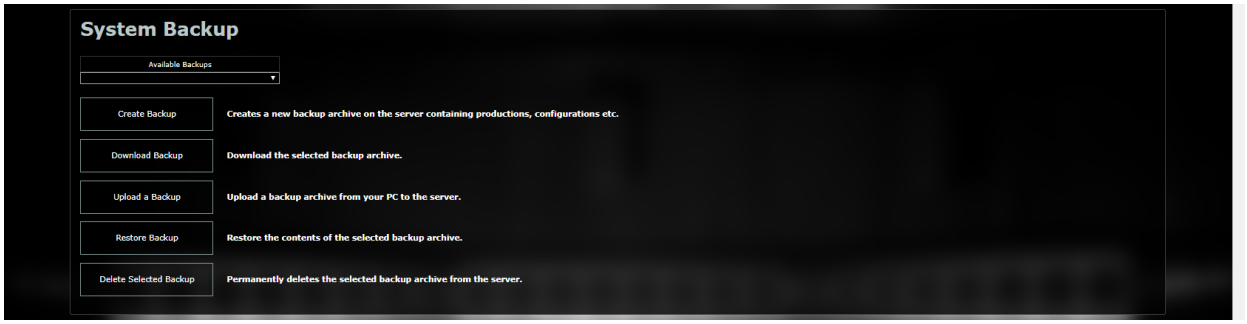


Fig. 81 Administration App - System Backup

3.11.5 Controls

The *Controls* section provides buttons to stop or restart the Rendering Unit and download Logs.

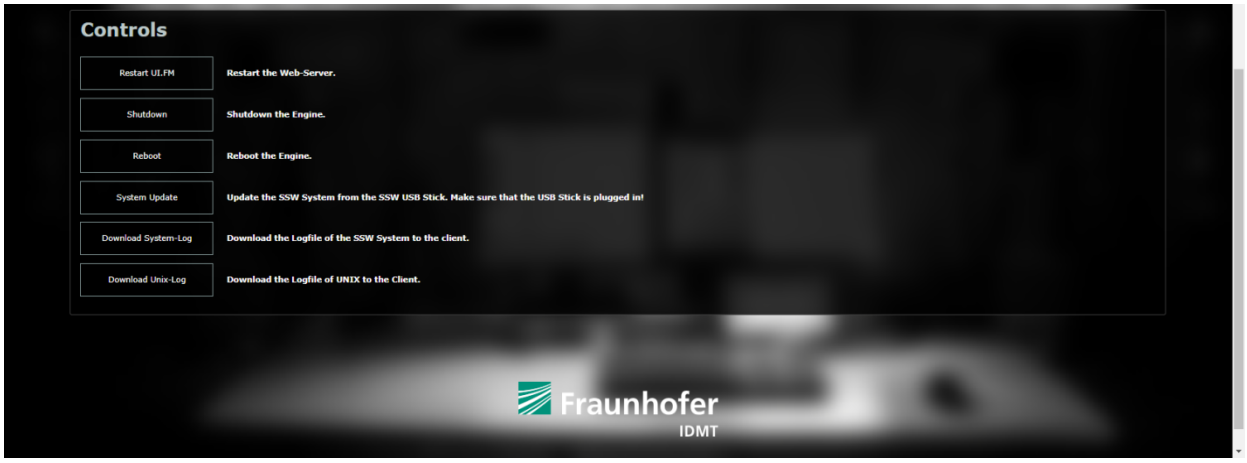


Fig. 82 Administration App - Controls

4 Annex

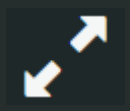
4.1 Appendix

2D	Source moves on horizontal plane.
3D	Sources are distributed 3 dimensional.
Canvas	GUI for positioning and automation.
Sourcestrip	Control panel for source configuration and level monitoring.
Distance Dependent Delay	Enhanced spatial impression by using distance delay.
Distance Dependent Loudness	Center distance dependent reduction of a source's volume.
F.l.t.r.	From left to right.
F.t.t.b.	From top to bottom.
Grid	Scaling markers for orientation on the Source Canvas.
GUI	Graphical User Interface: opticval representation, accessed via Google Chrome
Index	Number on top of each Sourcestrip.
Production Master	Control and monitoring of output level of the Production App.
Minimum Delay	Enables an artefact-free movement of sources without position delay.
PA	**P**ublic **A**ddress: sound systems used to cover a large area
DTS	**D**edicated **T**o **S**ound/former **D**igital **T**heater **S**ystems: series of multichannel audio technologies
Plane Wave	Source is synthesized broadly/planar.
Point Source	Source is synthesized punctual.
Renderer	Applies incoming GUI metadata on the audio content of the playing unit.
Night Mode	Source Canvas uses a dark grey background instead of a white one.
Timecode	Transfers time data for synchronization.

4.1 Quick Start

4.1.1 Sessionmanagement and Timecode

	Opens the sessionsexplorer
	Navigate to previous directory
	Saves the current session
	Session Lock: Prevents flagged sessions to be overwritten
	Exports a session file via browser download
	Deletes session after confirmation
	Visibility-Flag: De-/Activates visibility of sessions for normal users

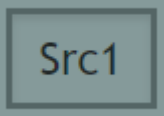
	Admin access: Opens password prompt to access admin mode
	Scaling: Enables the adjusting of a production to any room size
	Sff Generator: Opens extra window, to generate Sff-Files
	Settingscontrol: Provides access to several parameters for audio and visuals

4.1.2 Settingscontrol

Setup	Allows starting of the Renderer by choosing a setup to start
Stop	Cancels/aborts rendering
Timecode	Allows to switch between Master- and Slave-Mode in timecode
Reboot Engine	Reboots the Rendering Unit
Shutdown Engine	Shuts the Rendering Unit down
Show Grid	Enables/disables grid on *Source Canvas*
Show Circles	Shows/hides Circles on *Source Canvas*
Show 3D Corpus	Shows/hides *3D Corpus* on *Source Canvas*
Show 3D Effects	Shows/hides shadows of single *Sources* above the *3D Corpus* on the *Source Canvas*
Show Loudspeakers	Shows/hides speaker symbols and positions on *Source Canvas*
Show Loudspeaker Labels	Shows/hides speaker Labels on *Source Canvas*

Show Animation Paths	Shows/hides paths of following Animations on *Source Canvas*
Night Mode	Activates/deactivates Night- Mode
Show 3D View	Opens new window with 3D-View of current Setup
Automation	Opens *Automation App* in a new Browser-Tab
Cue Editor	Opens *Cue Editor* in a new Browser-Tab

4.1.3 Sourcestrip

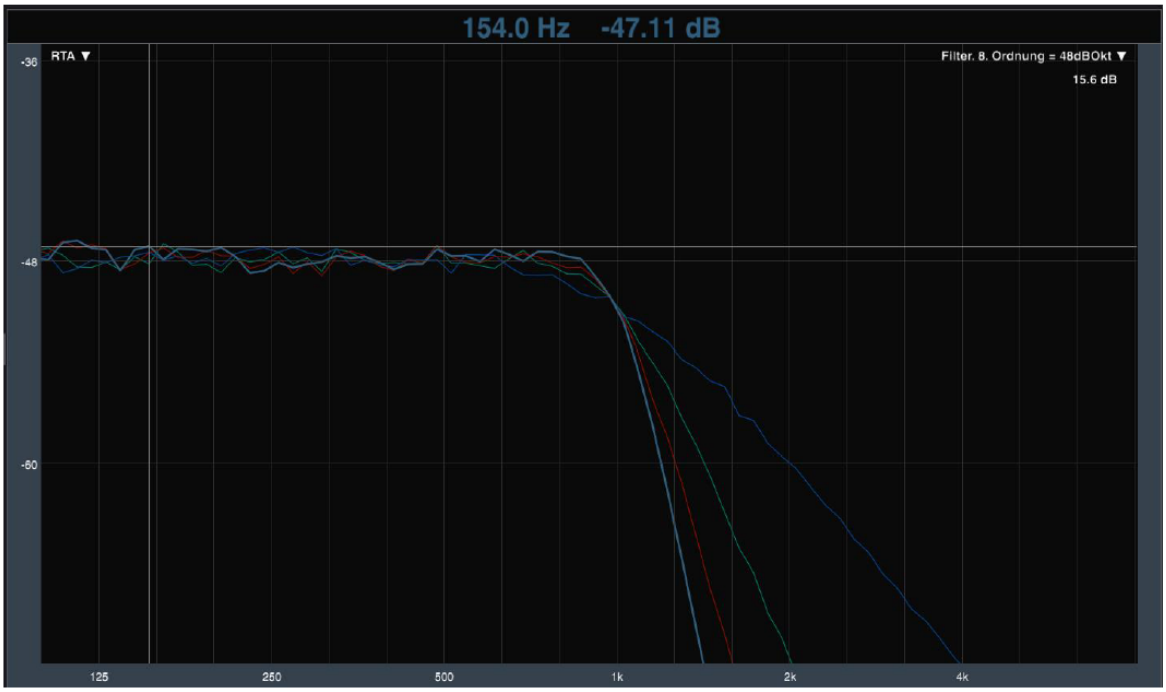
	Master mute/unmute button. Icon changes depending on status. CAUTION: Mutes rendering unit output, not player unit. The related master fader monitors/meters master volume of the rendering unit output.
	Index of respective *Sourcestrip*. Activates/deactivates a channel. Upon activation, the respective source appears on the *Source Canvas*.
	Shows current Label of the source, can be edited by clicking on it. The Label for each source will also be shown on the Source Canvas.
	Activates plane wave feature. Sources are initially synthesized as point sources. The respective icons on the *Source Canvas* adjust graphically.
	Activates minimum delay feature. Eliminates phasing artefacts from moving sources.
	Toggle between 3D and 2D(planar) sources.
	Activate LFE for this Source, “LFE Only” is only available if LFE is activated
	Solo button for the respective channel/source. Mutes all other sources. Highlights the chosen source in canvas.

	Mute button for the respective channel/source.

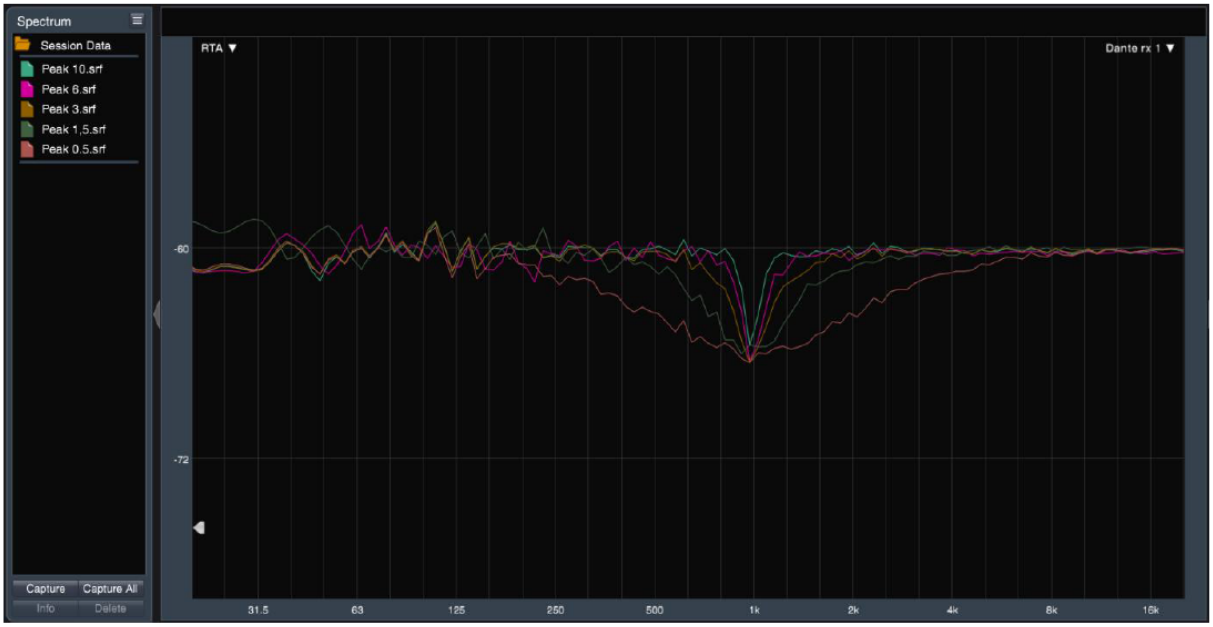
4.2 Filter settings and corresponding curves

Q Values for SSW Filter of different Orders

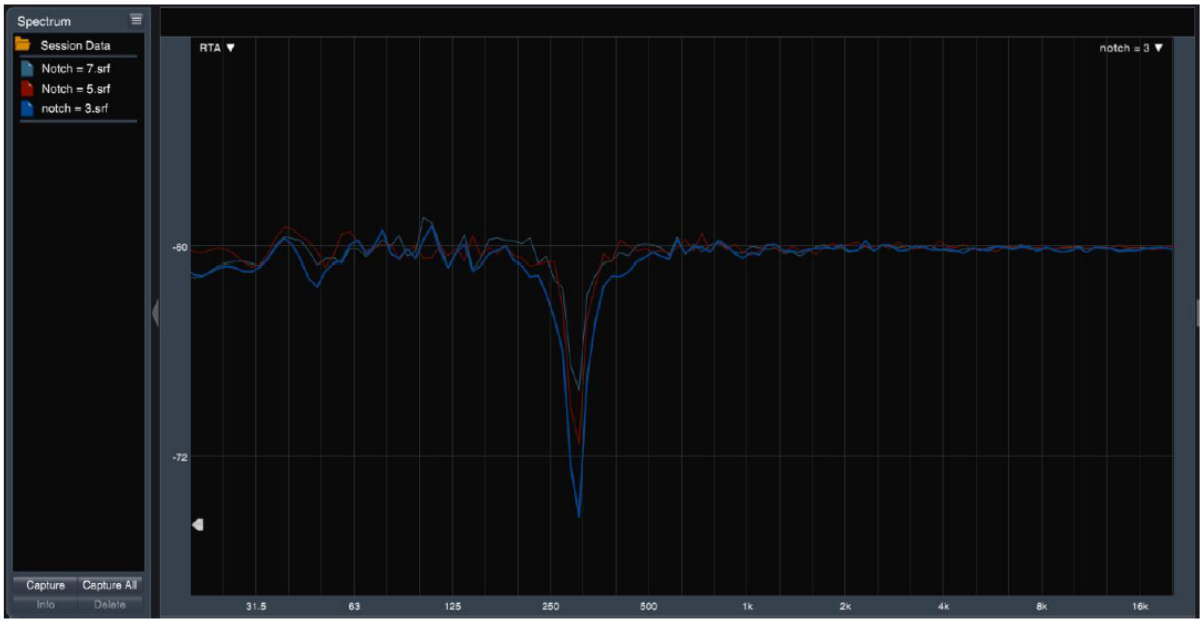
	Q Filter 1	Q Filter 2	Q Filter 3	Q Filter 4
2. Order 12dB/Oct	0,707	/	/	/
4. Order 24dB/Oct	0,54	1,307	/	/
6. Order 36dB/Oct	0,518	0,707	1,932	/
8. Order 48dB/Oct	0,51	0,601	0,9	2,56



Peak-Filter with different Q-Values



Notch-Filter with different Q-Values (Q = 5 good Value for Notch (-12dB with good slope))



4.3 Troubleshooting

System plays no sound (no input and/or output):

- check if the renderer is running and the right setup is selected
- check that the volume faders (master and application volume) are unmuted and loud enough to hear sound
- check if the right soundcard is selected
- check if all cables are plugged in at the corresponding soundcard connections
- check the sampling frequencies of your sources (DAW or Mixingdesk) → sampling frequency must be set to 48 kHz

No Timecode Input:

- check if the timecode sampling rates between source and renderer matches (change the samplingrate of the renderer in the *Configurator App*, see *3.2.2*
- check that the right timecode channel is selected (change the timecode samplingrate and channel in the *Configurator App*, see *3.2.2*

No access to the renderer via remote client:

- check that you use the right ip-address of the renderer
- make sure you've added the right port after the ip address (e.g.: 192.168.2.1:**1340**)
- make sure that your remote pc and the renderer are in the same subnet (e.g.: ip of renderer: 192.168.2.1; ip of remote pc: 192.168.2.10)
- check that all network cables are pluged in correctly
- when you use a switch with dhcp server make sure that the address pool is not out of range

Test Signal Generator plays no signal:

- check that the test signal is enabled and the play button is active
- make sure the corresponding loudspeaker is selected
- make sure the volume fader is up

Loudspeaker EQ doesn't work:

- check that the EQ is not bypassed

Objects only move in 2D area:

- check if the 2D-flag is deactivated

- check that in “manual z mode” the z- coordinate is not 0
- check if a *3D Corpus* is selected (you can change the *3D Corpus* in the *Configurator APP*, see *3.2.4*

Object plays only low frequencys:

- check if “LFE” and “LFE only” are deactivated in channel strip

Objects don’t move or don’t move correctly:

- check if the timecode settings are correct
- check the positions of the animations (check the offset of the timecode signal)

Can’t hear any sound from RSM:

- check that the right preset is selected
- check that the *RSM* is not muted
- check that you’ve activated at least one object as RSM source

Can’t see new uploaded SFF Files in SFF Player:

- refresh file browser

SFF files or Sessions have the wrong scaling:

- use the scaller in *SFF Player* or *Production App* to adjust the size of the sessions or *SFF Files*