

# User Guide

AX32 SPQ card and Pro Mon 3 option



**NTP TECHNOLOGY**

A DAN TECHNOLOGIES COMPANY

**DAD**  
DIGITAL AUDIO DENMARK  
By NTP Technology

# IMPORTANT SAFETY INSTRUCTIONS

## READ AND KEEP THESE INSTRUCTIONS



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.



The garbage bin with a cross is intended to alert the user that the product may not be disposed of by regular garbage, but as electronic equipment.

**WARNING** – when using electric products, basic precautions should be followed, including the following:

Read all of the safety and installations instructions and explanation of graphic symbols before using the product.

1. Do not use this apparatus near water.
2. Clean only with dry cloth.
3. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
4. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
5. Do not defeat the safety purpose of the polarized or grounding-110 to 125V type plug according to UL 817 and CSA C22.2 no. 42. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
6. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
7. Only use attachments/accessories specified by the manufacturer.
8. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
9. Unplug this apparatus during lightning storms or when unused for long periods of time.
10. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

### DANGER

Improper connection of the equipment-grounding can result in a risk of electric shock. Do not modify the plug provided with the product – if it will not fit the outlet have a proper outlet installed by a qualified electrician. Do not use an adapter which defeats the function of the equipment-grounding conductor. If you are in doubt as to whether the product is properly grounded, check with a qualified serviceman or electrician.

The product must be grounded. If it should malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. This product is equipped with a power supply cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into an appropriate outlet which is properly installed and grounded in accordance with all local codes and ordinances.

**WARNING**

- This product, either alone or in combination with an amplifier and speakers or headphones, may be capable of producing sound levels that could cause permanent hearing loss. Do not operate at a high volume level or at a level that is uncomfortable. If you experience any hearing loss or ringing in the ears, you should consult an audiologist.
- The product should be located so that its location or position does not interfere with its proper ventilation.
- The power-supply cord of the product should be unplugged from the outlet when left unused for a long period of time. When unplugging the power supply, do not pull on the cord, but grasp it by the plug.
- Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.

**SERVICE**

- Do not attempt to service the product beyond that described in the user maintenance instructions. All other servicing should be referred to qualified service personnel.
- The product should be serviced by qualified service personnel when:
  1. The power supply cord or plug has been damaged, or
  2. Objects have fallen, or liquid has spilled into the product, or
  3. The product has been exposed to rain, or
  4. The product does not appear to be operating normally or exhibits a marked change in performance,  
or
  5. The product has been dropped, or the enclosure damaged.

**WARNING** – Hazardous moving parts inside the unit. Keep fingers and other body parts away.

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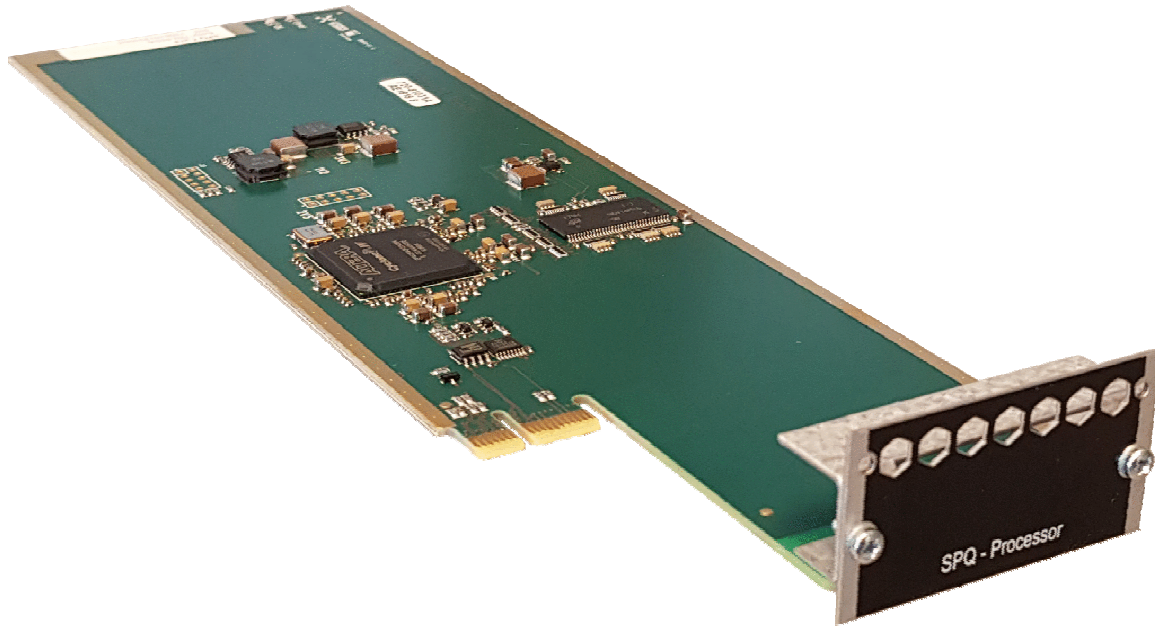
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## General description.

This user guide gives an overall introduction to the operation of the AX32 with a SPQ card installed. The functions of the card, once installed in the AX32, is managed via the DADman software, and functionality is enabled by the Pro|Mon License



**Note that the AX32 has to be installed with a Pro Mon license in order for the SPQ Card to operate.**

In order for the SPQ card work, the AX32 will also have to be installed with a software and firmware referred to as version 5.3 or later. This version covers DADman version 5.3, AX32 firmware version 2.1 and Brooklyn 2/Dante module firmware version 4.0. Please refer to the related release notes and installation guide for more details on the new features and how to upgrade AX32 units that are not supplied with version 5.3 or newer from the factory.

The user guide has a focus on SPQ operation, and also on some of the new Pro|Mon 3 functionalities. However, a complete description of the Pro|Mon functionality in general is not included.

All screen examples are taken from the PC Windows 10 version of DADman. DADman 5.3 is also available for Mac OS X.

### Accessing the SPQ cards.

One or more SPQ cards can be installed in the AX32. For most applications, only one card is necessary. The cards can be installed in any of the available card slots and will be configured automatically by the software.

### SPQ functionality.

The SPQ Speaker Processor System is extremely flexible and you can match it to any speaker configuration, including various immersive audio formats such as Dolby Atmos™. The Filters of the

SPQ card can be configured in a very flexible way. The workflow for tuning a speaker system will involve an AX32 with the SPQ option, and an audio measuring system for measuring the frequency response of the speakers in the room. Please note that this measuring system is not a part of the AX32 functionality.



**Please note that a separate audio measurement system will be needed in order to measure the speaker frequency response, and the effect of the editing and equalization made by the SPQ card to the speaker system.**

Management of the controls is handled via the DADman control software, where you can configure processing for all output channels in the defined monitor profile - also on cue output signals. Processing can be applied for room tuning, bass management and equalizing of cue and monitor signals. You can easily save and recall all configurations in the DADman monitor profile. A general delay for a control room set-up, as well an individual delay per speaker channel, can be configured as well. The main features of the SPQ card are listed below.

- Room Tuning with up to 16 filters per channel with Parametric EQ, High Pass, Low Pass and Shelving characteristics.
- Bass Management with Support for multiple Subwoofers.
- 1,024 Filters, 128 channels @ 48 kHz.
- Native filters for all sample rates from 44.1 kHz to 384 kHz.
- Adjustable Latency of up to 800 ms per channel, divided as 0-200 ms as general delay and 0-600 ms as additional channel delay.
- Speaker-match between various immersive audio formats, e.g. fold-up and fold-down.

## Operation

### **Inspecting the SPQ card and firmware versions.**

The installed firmware version and unit configuration can be inspected in the device list as shown below. The AX32 Firmware version and the Dante module version can be seen by scrolling the list. Below is shown the SPQ card installed in slot 6.

Device List ✕

Serial port	Status	Unit ty	Unit	Unit Name	Serial numb
<input type="checkbox"/> Intel(R) Active Management Technolo...	-	-	-	-	-

IP Address	Status	HW Status	Unit ty	Unit	Unit Name	Serial numb	License
<input checked="" type="checkbox"/> 169.254.233.	Unit ready	OK	AX32	1	AX32	AX32-00479	Gain/s

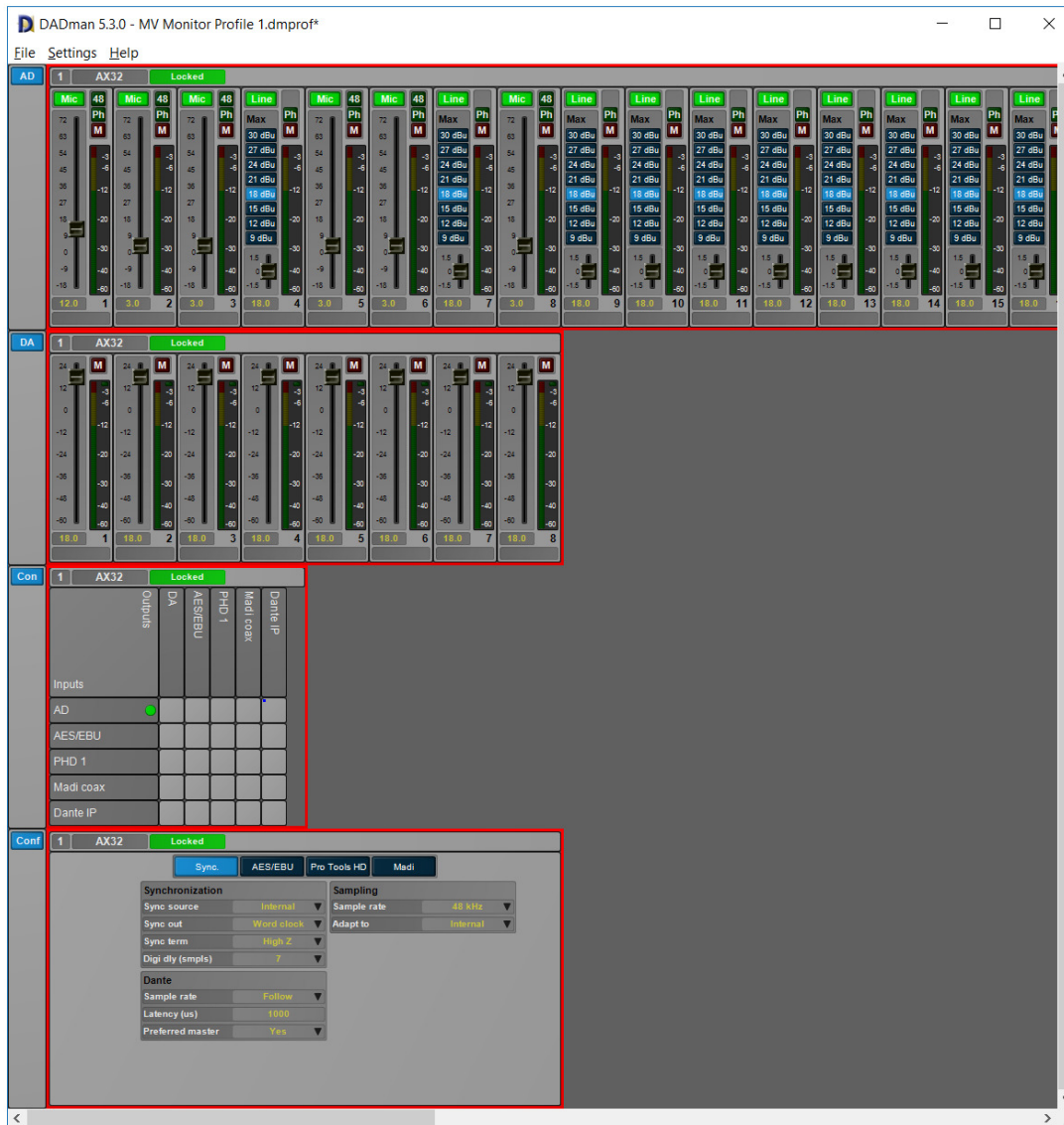
Item	Slot	Stat	Type and versi	Serial Numb	FW version
AD Mic Card	4	OK	720130A 150	7201301745	fpga: 1.1.4.1
AD Mic Card	5	OK	720130A 150	7201301745	fpga: 1.1.4.1
SPQ Card	6	OK	720610A 180	7206101825	fpga: 1.0.0.2
AD Mic Card	7	OK	720130A 150	7201301745	fpga: 1.1.4.1

↑  
↓

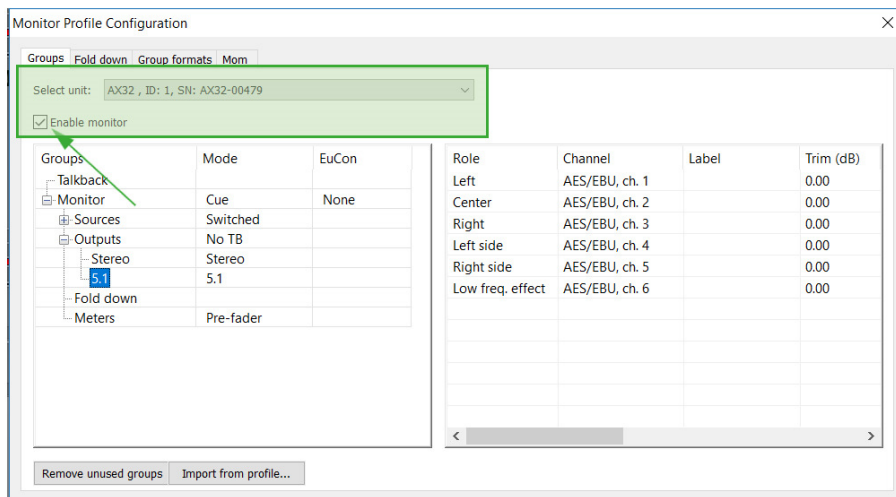
Close Refresh

**DADman basic user interface**

The DADman GUI when no Pro|Mon functionality is enabled is shown below.

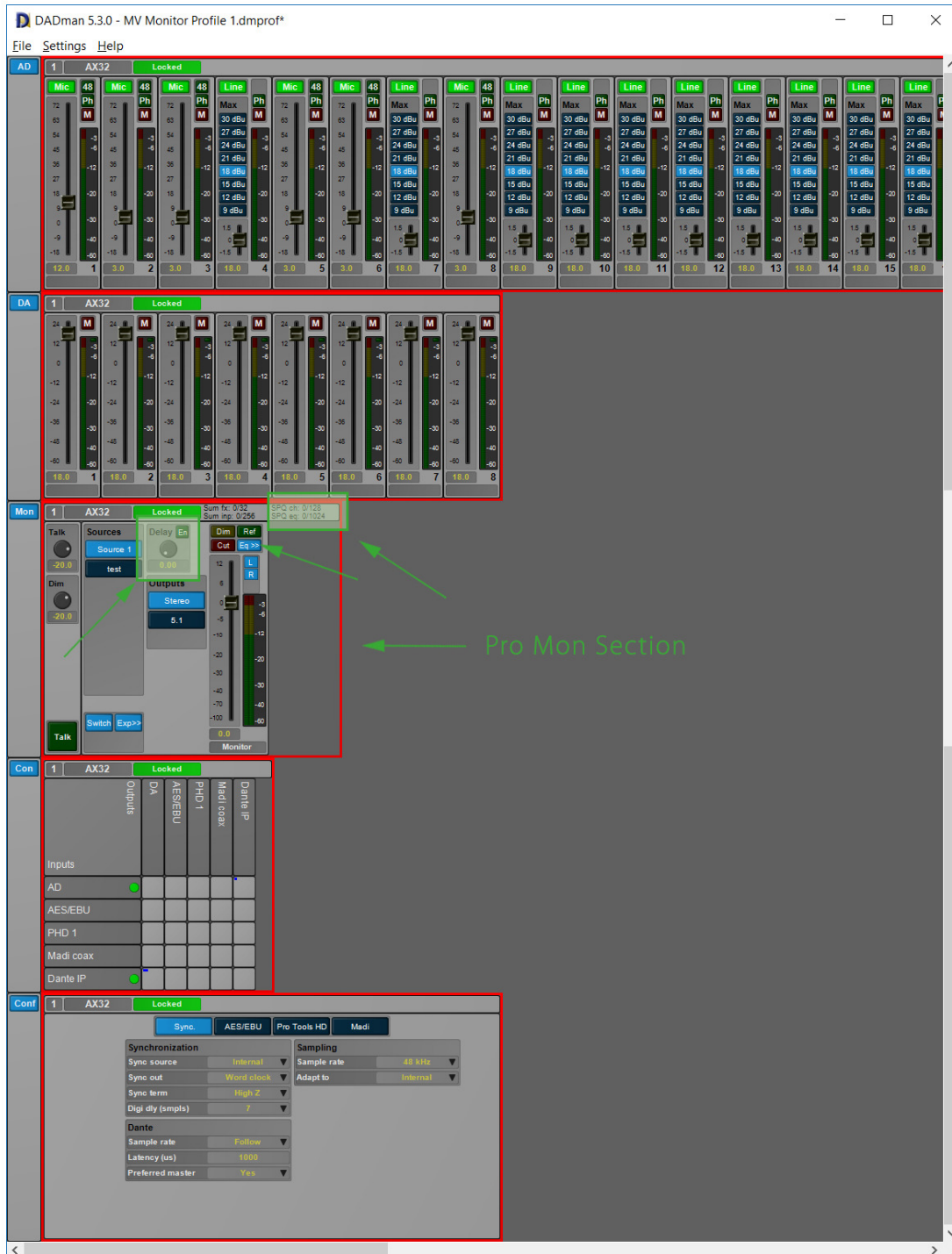


In order to enable Pro Mon, select the **Monitor Profile Configuration** in the **Settings** menu and select the unit to control.





The DADman GUI will then have an added monitor control section in the main view as shown below.



In addition to the previous controls of Pro|Mon, a control for general delay for the whole profile have been added as well as an **Eq>>** button, and a status showing the allocated EQ resources.

General Delay:

The delay can be set from 0 to 200 milliseconds (ms) in increments of 0.01 ms, which equals 10

microseconds. The lowest increment, however, is also one sample so depending on the sample rate, this give different time values. At 48 kHz a sample is 20.83 microseconds, so the value set will be rounded to the nearest sample value. This rounding is not shown in the GUI.



**Note that the value can be entered by the rotary knob, operated by using the mouse or by entering the numerical value from the keyboard.**

The general delay can be enabled and disabled via the **En** button. This button can also be automated via the DAD Monitor Operating Module (MOM) for easy and fast hands-on access.

#### EQ Viewing:

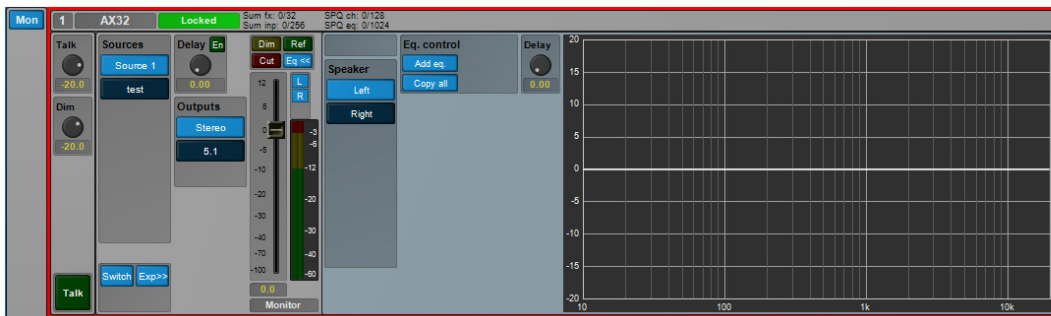
The EQ for all speaker channels in the control room speaker set can be edited and viewed by activating the **EQ>>** button. Note that the button do not enable or disable the filters, it just changes the view.

#### EQ filter resources:

Depending on configuration and sample rate, the resources of the EQ card will be used and loaded to various levels. Equal to the summing engine viewer, the SPQ viewer will show the available and used resources for amount the filters used out of the maximum of 1,024, and the number of channels used out of the maximum of 128. If more SPQ cards are installed, the resources available are increased accordingly.

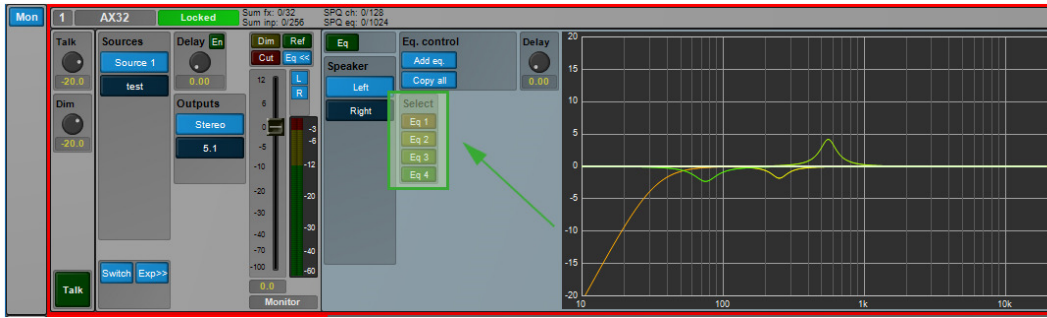
#### **DADman EQ management window**

Below is shown the monitor section with expanded EQ view.

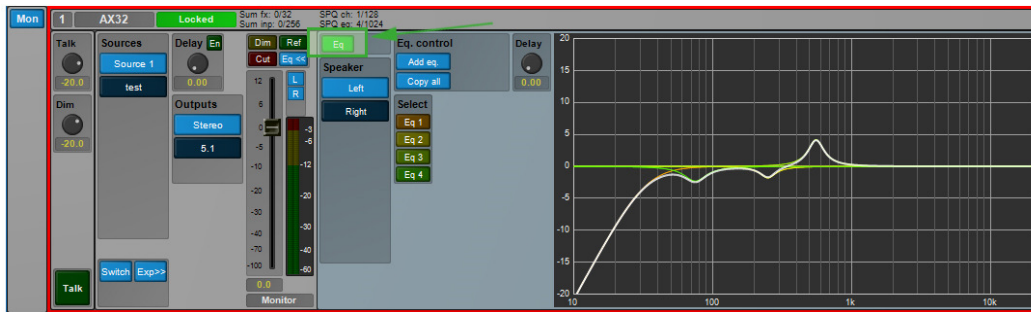


The EQ view above shows the assigned EQ for the selected stereo speaker channel of the selected output speaker set. Above is shown the right channel of the stereo speaker set. The channel delay knob controls the delay of the selected channel. This delay can be set between 0 and 600 ms in resolution of samples down to 10 ms equivalent to the resolution of the general delay setting. In the figure no EQs are yet configured.

In the below figure, you can see the left channels with four EQs configured. They are shown in the graph with matching colors. The resulting EQ response for all the enabled filters is shown as a white line. Below, the EQ is not enabled for the channel so the response is flat.

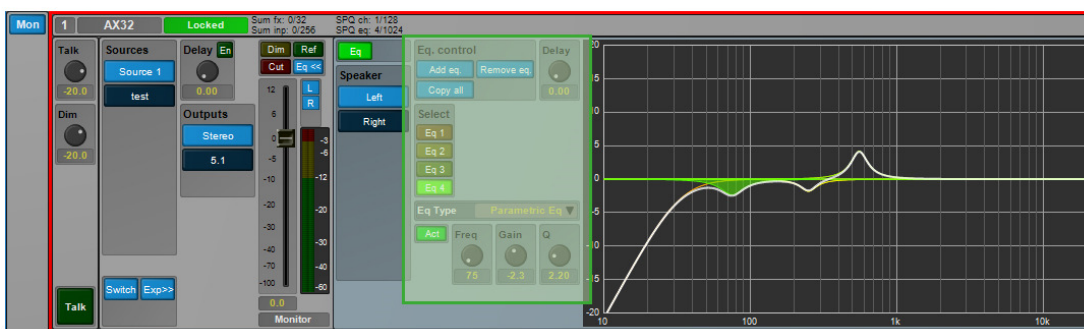


When engaging the **Eq** button the filters will be activated. Shown on the figure below, the white curve is now showing the resulting frequency response for the EQs of the selected channel.



### Configuring the EQ channel

Below is a description of the various EQ control knobs and functions used for configuring and editing an EQ channel.



It would appear that the controls are relative self-explanatory. They have the following functions:

#### Add Eq/Remove Eq buttons:

Activating this knob will add an EQ to the view, both as a selection knob named Eq 1 to 16, and as a flat curve. A maximum of 16 EQs can be added per channel. In the same way a selected EQ can be deleted by activating **Remove Eq**.

When an EQ is added, the EQ type can be selected by the **Eq Type** drop down menu. Frequency, Gain and Q can be set for the selected EQ filter, and the curve in the view will reflect the setting.

Frequency Gain and Q knobs:

These knobs can be operated by the mouse or values can be set by clicking the value field and typing a numerical value via the keyboard.

Act button:

The **Act button** will activate or deactivate the EQ filter of one particular selected EQ filter on a channel, whereas the **Eq button** referred to above will enable or disable a whole set of filters for the particular channel.

Copy all button:

The total combination of the EQ filters for a channel can be copied and pasted on at other channel. Activate **Copy all** on the channel from where you wish to copy. Select another channel in the speaker set and activate **Paste all** in order to paste the filter configuration. The **Paste all** button is only visible when a curve has been copied.

Eq Types

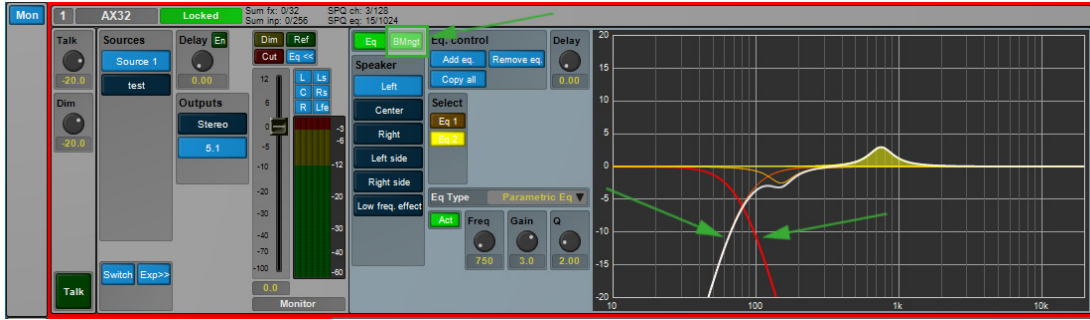
The following EQ types can be selected:

- Parametric EQ filter
- Shelving filter, High Pass, Low Pass
- Butterworth filter, High Pass, Low Pass
- Linkwitz Riley, High Pass, Low Pass

The figures above show configurations for a stereo speaker set. When configuring the speaker set, the **speaker format** has to be selected from the preset or custom format list. Below is a figure showing a 5.1 speaker set as the selected output speaker set. The speaker output sets can be configured freely in the monitor profile editor. As the 5.1 format include an LFE channel, an additional curve is shown in the graph reflecting the presence of the LFE channel. As shown in the figure below.



When a speaker set format with one or more speaker SUB channels is selected like 5.1 with one LFE channel, it is also possible to apply Bass Management functionality to the speaker set.



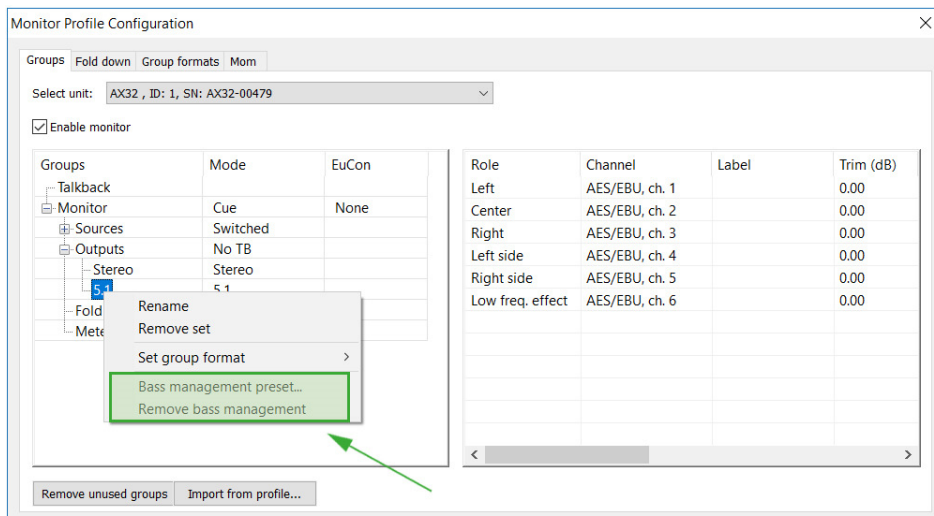
Bass Management for a speaker set is enabled by activating the **BMngt** button, as shown in the figure above. Once this is enabled, the curve for the selected speaker will reflect the high pass filter applied in the white resulting curve. When selecting the LFE/SUB channel the response for the low pass filtered curve is shown. The low pass filter curve is also shown in the non-SUB channels as an additional piece of information.

In the following section, the configuration of the Bass Management system is described.

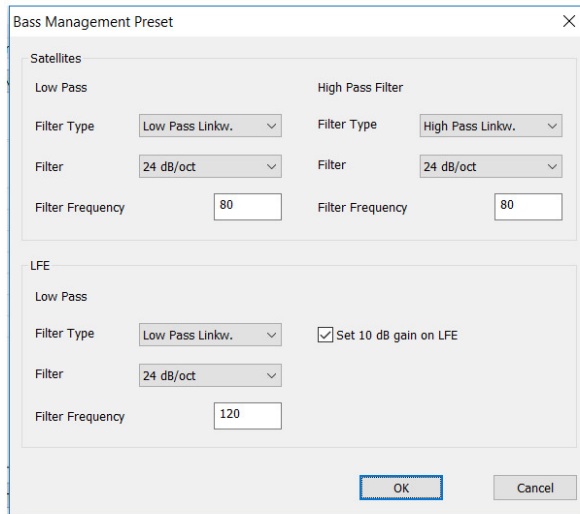
### Configuring Bass Management

The configuration of the Bass Management system is done in the Monitor Profile Configuration window. A Bass Management configuration can be made for all speaker output sets, where the speaker format comprises one or more LFE/SUB channels. In relation to the format conventions, a translation is made between what is the LFE channel in the signal source, and what are the SUB woofer speakers in the speaker setup, and in that relation, the mapping between LFE, Bass-managed speaker channels and SUB woofer speakers is also made. The traditional SUB woofer setup for e.g. a 5.1 speaker system has the SUB connected to the LFE source channel, but Bass Management can be applied as well, filtering the low frequency from the surround speakers to the SUB woofer speaker. This is the Basic Bass Management configuration also applied in Pro Mon.

In order to configure the Bass Management setup in general, or to make a starting point for a more complex Bass Management system e.g. with multiple SUB woofer speakers, configuration is done in the Bass Management configuration window selected for the relevant speaker set, as shown in the picture below



When selecting **Bass Management preset** an editing window will appear as shown in the picture below.

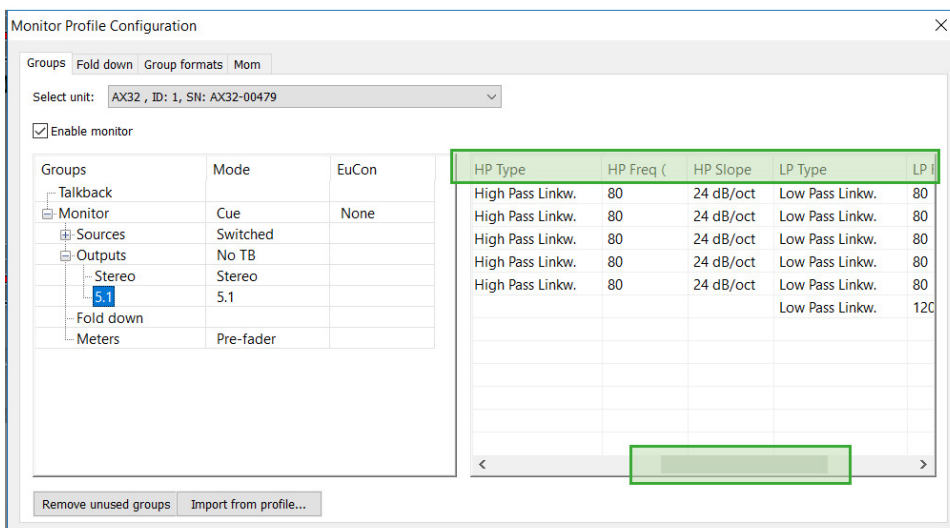


All speakers in the profile will have a high pass filter applied, and the summing for the SUB woofer will have the applied low pass filter with the entered parameters. The Summing of the LFE source will have the selected low pass filter applied as well. Further, A 10 dB gain on the LFE channel can also be applied.



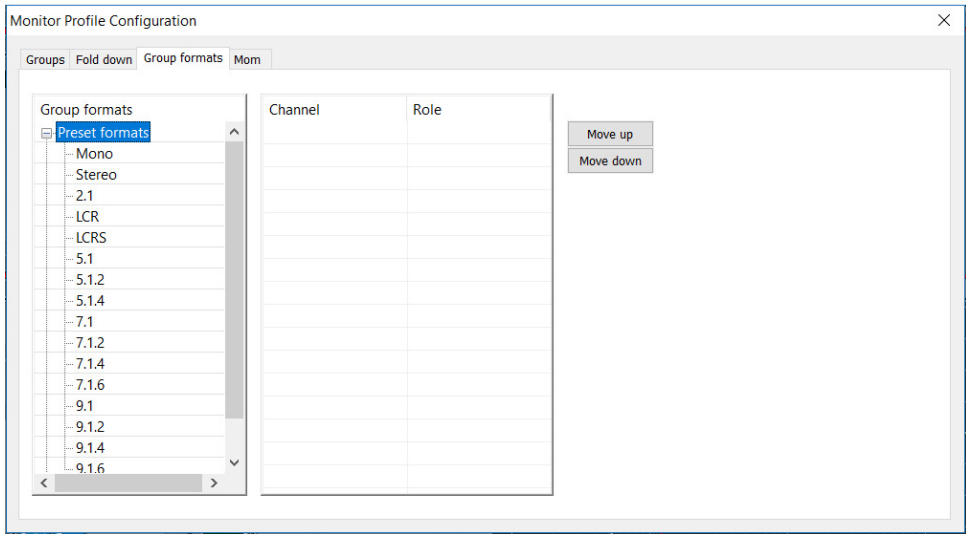
**Please note that if 10 dB is applied to the LFE channel, it will be active on the output speaker setting, and all sources selected to the speaker set will get the additional gain on the LFE channel. Alternatively, the raise in LFE gain can also be set in the input configuration for the sources where this is needed.**

When the Bass Management preset has been applied to the output set, it can be viewed and further edited in the monitor profile window for the actual speaker set. As shown in the pictures below, the Bass Management filter configuration for each speaker channels is visible when scrolling the window horizontally.

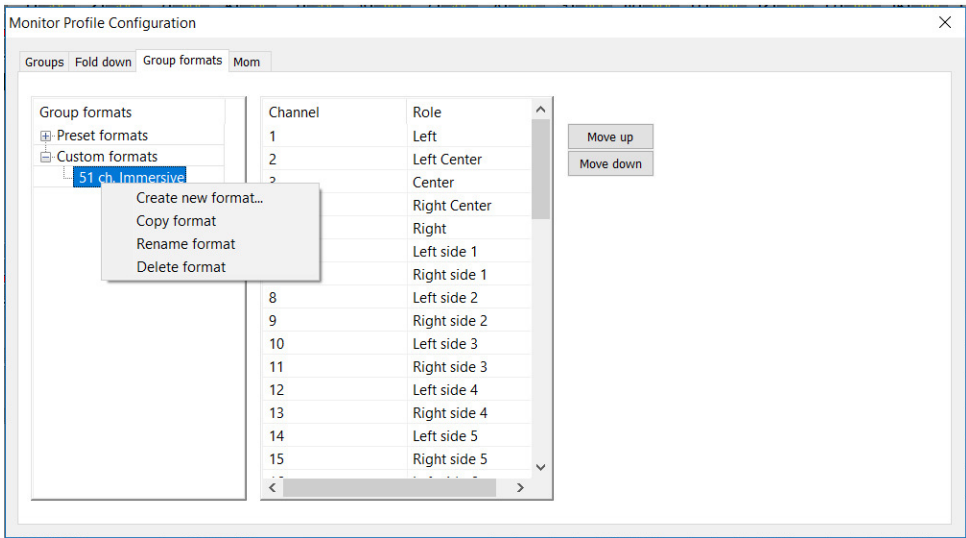




When selecting Preset formats, predefined Group formats can be viewed.

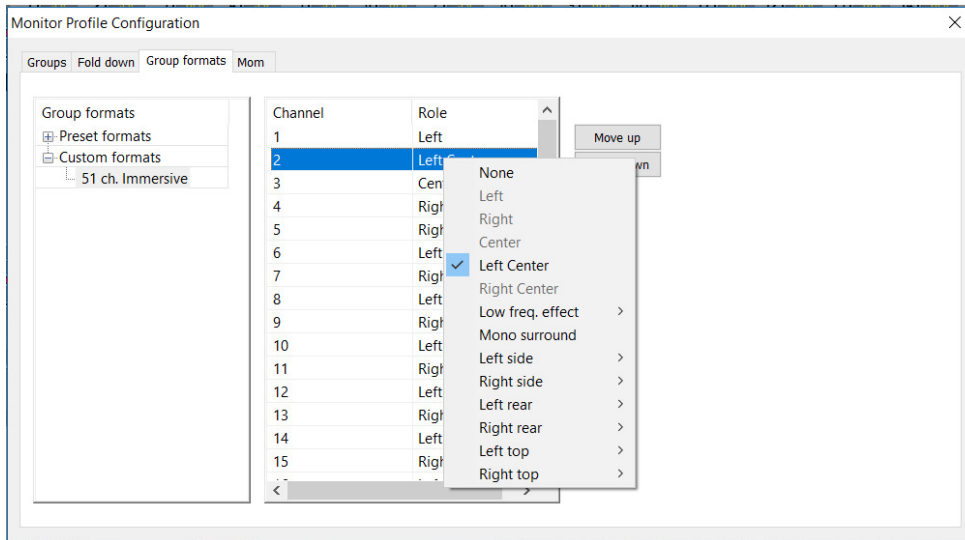


When selecting **Custom formats**, Custom Group formats can be created and edited, as shown in the picture below. If **Create new format** is selected, an editor window will open (not shown) for fast configuration of larger immersive speaker formats e.g. in Dolby Atmos mixing stages.



The Custom Group formats can also be created or edited by selecting parameters directly in the column view as shown in the picture below.



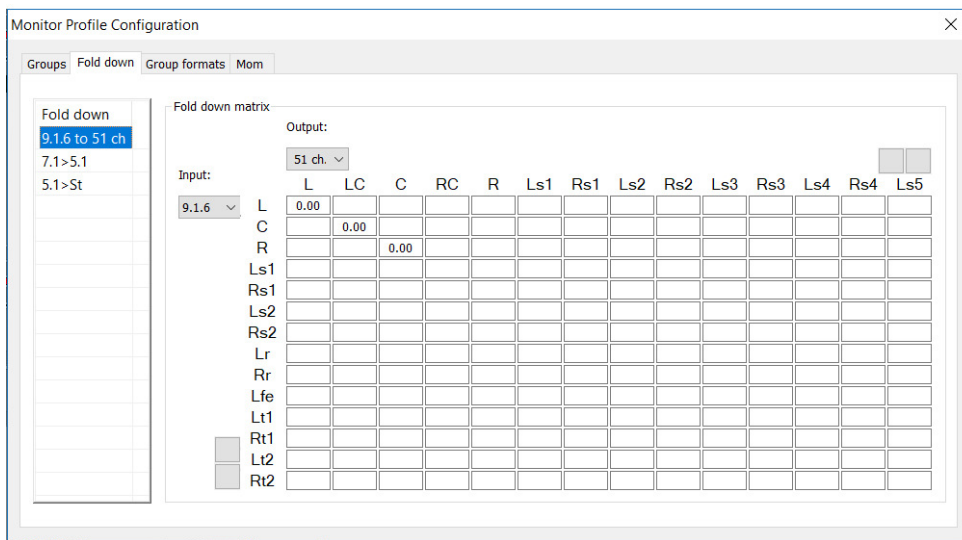


**Formats with crossover filters for active speakers, e.g. left and right in an immersive set-up, can also be created when working creatively with the group configurations. NOTE that the system does not provide protection if incompatible speaker configuration profiles are loaded sourcing e.g. tweeter speakers, which can be easily be damaged if correct filtering is not applied to the signals.**

### Fold-down and speaker match

Fold-down has always been available in Pro|Mon, with the ability to define a summing matrix, mainly to playback a higher channel count signal as source on a speaker set with fewer channels – e.g. 5.1 to stereo or stereo to mono. Now, with the Custom Group formats, matching any of the formats can be accomplished, including speaker up-match, which means that it is possible to enable playback of lower channel immersive formats on more speakers in a higher channel count speaker set-up.

The figure below shows the fold-down and speaker match configuration window. The two knobs horizontally and vertically in the view are scroll knobs for right/left and up/down scroll in the fold-down matrix.



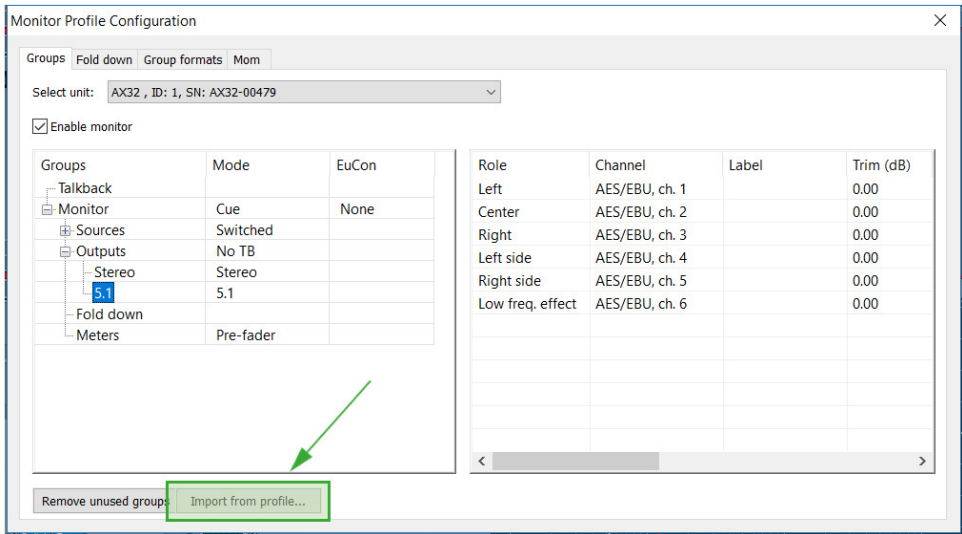
### Saving and loading the monitor profile settings

The monitor profile can be saved and recalled in the **file** menu. Note that in the preferences menu, the last-saved monitor profile can be set to load automatically when DADman opens the next time. The monitor profile file stores all monitor settings, including EQ and format configurations, loaded, activated and ready to go in the DADman. When a profile is loaded, all monitor settings are restored – also the settings for the SPQ card. In Pro|Mon 3, it is possible to load parts from another profile into the current profile.

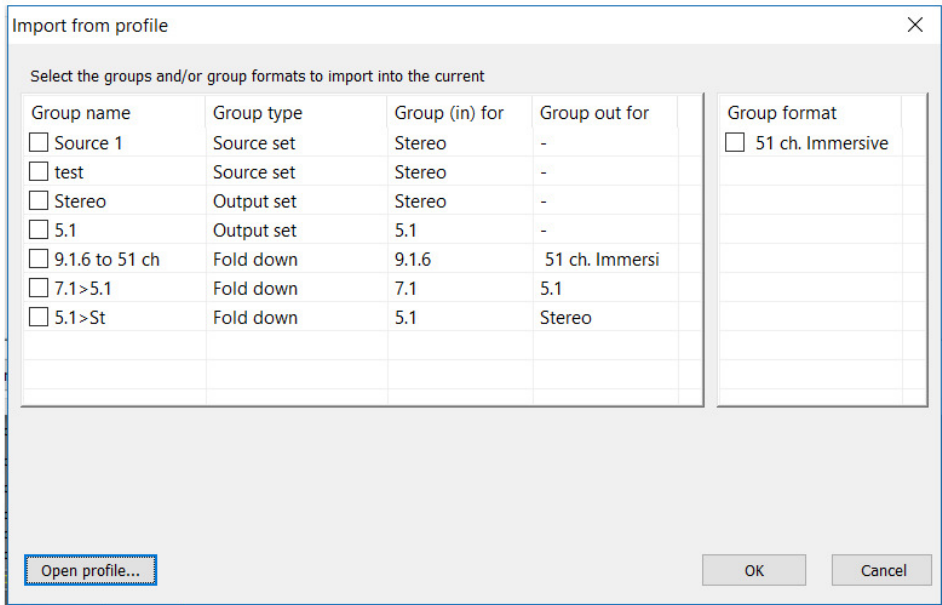


**NOTE that a profile, which is loaded, will assume that the I/O resources loaded are available in the actual unit. If this is not the case, the I/O configurations will be left blank.**

The monitor profile can be loaded partially by using the **Input from profile** function shown in the picture below.



This function opens the import window as shown in the picture below.



In order to import a monitor profile, a file has to be selected using the **Open file** function. When the file is opened the available groups and formats are shown, and the ones to be loaded in the actual monitor profile of DADman should be selected via the tick boxes. You can load the following **Groups types** and **Group formats** as shown in the two sections of the view:

Group format

Here is a list of the available Custom group formats referred to by the names. For example, 51 ch. Immersive. A format from this list will be available in the Custom format list when loaded. There is no allocation of I/O signals or SPQ parameters attached to the group format setting.

### Group type

This list has 3 categories **Source set, Output set and Fold-down**.

### Source set

This defines a group format related to sources. It will have the allocated physical inputs as well as gain adjust settings connected.

### Output set

This defines a group format related to speaker outputs. It will have the allocated physical outputs as well as gain adjust settings connected. Also, the SPQ filter parameters are connected. This is an easy way to manage different EQ settings for the speaker system.

### Fold down

This defines fold-down and speaker-match summing matrices. When loaded, the fold-down will be available in the fold-down list.