DXO CONTROL

PA MANAGEMENT SOFTWARE

▶ SETUP & OPERATION

Mac • iOS   Windows

Made in **Germany**

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PSSO

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Real-time control of PA systems – Made in Germany

DXO Control is an intelligent and powerful software for remote controlling of the digital PA controllers **DXO-26PRO** and **DXO-48PRO MK1/MK2** as well as the **PRIME** system amplifier by **PSSO**.

The control software enables a quick and effective programming of presets for your speakers systems. All adjustments can be made like via the menu of the individual units, however, the presentation is much more clearly arranged.

Users have full control over the built-in DSP modules of the units and can load, edit and save all functions on the computer or transfer them into the internal memory of the controllers or the amplifier respectively. For this functionality, the units are connected via a wired Ethernet connection to the same network as the control computer, which can be connected either wired or through WiFi. Local connectivity of the **DXO** PA controllers to the control computer from a front-panel USB connector is also possible in order to download initial settings or as a fallback in case of network failure.

The software runs on Windows 10 as well as on Mac OS X 11 and better. The operation is basically the same for all platforms; where differences exist they will be noted.

For product updates, documentation, software and support please visit www.psso.de. You can find the latest version of this user manual in the product's download section.

Contents

1   Installation

1.1   PC and Mac

To install the control software, start the installation program and follow the on-screen instructions. For Windows- and Mac-based computers, the software consists of two modules: the device manager that connects all units to the computer and the configuration window for adjusting the parameters. For iPad, both functions are integrated in a single window. In the following sections we will discuss DXO Control for Windows. However, Mac OS X will offer the same functionality. Individual options or their translations can change with software updates.
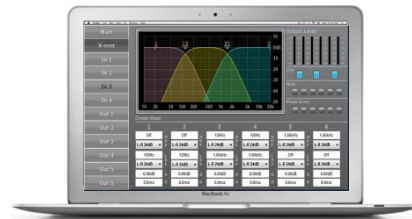
Fig. 1 *DXO Control on the MacBook*

Figure 1 shows DXO Control on the MacBook. To enable the software to connect to any of your devices, you must either disable your internet firewall or include the application in the list of programs that are allowed access through the firewall. Switch on your device and launch DXO Control. The device manger will show the devices found on the network together with their mac address and IP address, similar to **figure 3**. The '**>**' icon at the right side for launching the configuration window may be either **>** or **>**. When **>**, the unit is online and can be activated by clicking the **>** icon.

1.2   iPad and iPhone

Fig. 2 *DXO Control on the iPad*

The app **DXO-Control** for iPad is available as a free download on the App Store. In addition, a version with limited functionality is available for iPhone.

2 Device manager

Fig. 3 *The device manager*

The main purpose of the device manager is to select a particular unit for manipulation and/or to group several units in a group. Use **File** > **Exit** to exit the program. The available Tools commands are shown in **figure 4**.

Note: You can modify the unit name in the configuration.

Fig. 4 *The "Tools" menu*
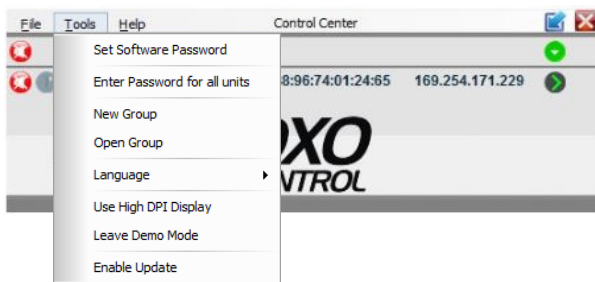
2.1 Tools > Set Software Password

It is possible to set up a password to access the graphical DSP software main screen. This will be discussed in more detail later in section 3.2.6.

2.2 Tools > New Group

This command allows you to combine several online units into a named group. The group will be added to the list (row **Group: …**) in the device manager (→**fig. 5**).

Fig. 5 *Showing a group in the device manager*

Clicking the cross icon **x** on the right deletes the group; clicking the blue tool icon opens a screen where you can select the members of the group; you will be able to select any unit which is online to become a member of the group. A further selection from this screen opens a dialog where you can specify which parameter, for which setting and for which channel you wish to link within the group. For instance, you can link only gain, or gain and limiter settings for only output channels. An example setting screen is shown in **figure 6**.
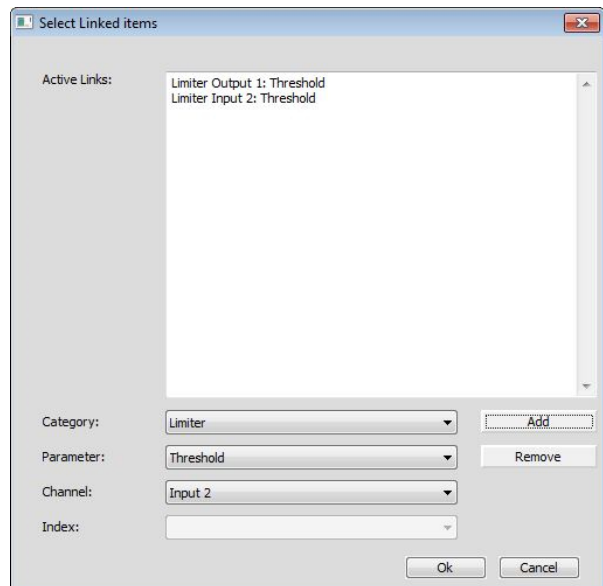

Fig. 6 *Sample dialog box showing linked items for a group*

2.3 Tools > Enter Demo Mode

Allows you to exercise the functionality of a DXO/PRIME unit without hardware present for training and familiarization purposes. Various virtual units with the additional designation "**DEMO…**" will be added to the list.

2.4 Tools > Disable/Enable Updates

When set to Enable Updates, there will be an indication when firmware updates for the unit will be available. This is shown on the right edge of the unit identification in the control program with a 'rotary' icon, see **figure 7**. The icon turns orange when updates are available. Clicking the icon will initiate the download and installation of the update.

Fig. 7 *The "rotary" icon at right indicates firmware update for this unit is available*

Notes: The control program and the unit must be equipped with matching firmware versions to ensure smooth communication. If the version of **DXO Control** is newer, the firmware of the units may be updated via the control program. With this update, all settings saved on the units will be lost. To keep the settings, save them on the computer (→section 3.1.1).
Units connected via the USB interface cannot be updated. To update these units, connect them via the Ethernet interface.

2.5 Launching the configuration window

Clicking the green **>** icon at the right of the connected unit info line in the device manager will load the configuration window for the unit. At this point, the software will go through a synchronization cycle and, if a PIN was defined before, will ask for the PIN (→section 3.2.6.).

The configuration interface screen will come up similar to **figure 8**; this is the opening screen of the actual application controlling the settings of the unit. Any settings changed will be instantly transferred to the units.

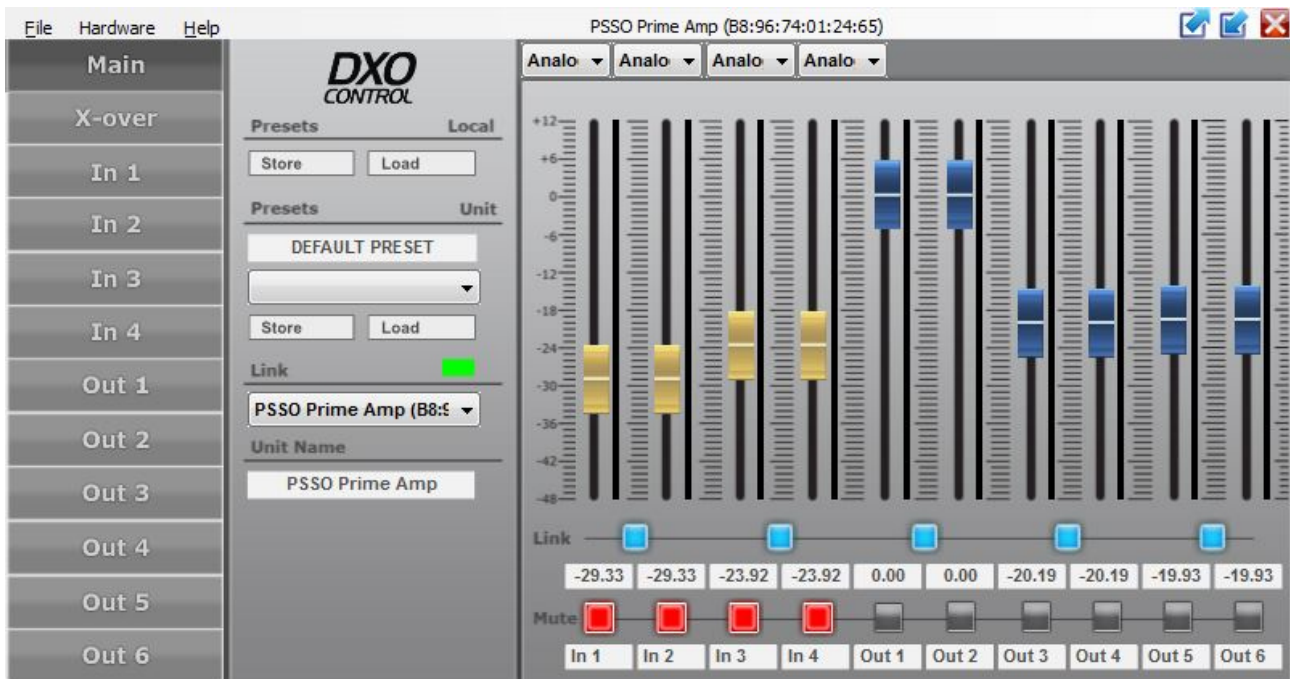|	
Note:	The iPad app does show a screen similar to figure 8; as mentioned, there is no separate device manager but the connectivity and address data is shown at the bottom of the graphical screen.

3 Configuration window: menu bar

Fig. 8 Configuration window

Figure 8 shows the main screen from which all setup screens and options can be reached.

3.1 File commands

3.1.1 File > Open and File > Save

Presets are the collections of all settings for a particular configuration. They can be saved on the computer or in the actual unit. With these commands you can save a complete setting and reload it at a later time.

3.1.2 File > Backup presets and File > Restore presets

These commands operate similarly to Save and Open, but in addition offer the choice to use the .preset file format or the .txt format. Text files are a way to archive a particular set of settings for documentation purposes.

Note: The same functionality is available directly on the center column under Presets Local using the buttons Store and Load. Saving/loading presets in .txt format is inhibited when the unit is locked (→section 3.2.4).

3.1.3 File > Create Flash Image

For data backup or data transfer to a different unit, the entire settings and presets as well as the firmware of a unit can be saved in a flash image file: Call up the menu item **File** > **Create Flash Image** and select a file name and a storage location.The file can then be loaded via the menu item **File** > **Load Factory File**. A flash image first triggers a firmware update and before the factory file is being loaded.

3.1.4 File > Quit

Call up this menu item to exit the program or close the window.

3.2 Hardware commands

The hardware menu offers several functions as shown in **figure 9**.
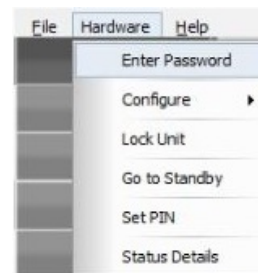
Fig. 9 Hardware commands

3.2.1 Hardware > Enter password

To be discussed in section 3.4.

3.2.2 Hardware > Configure

The **Configure** menu item opens an additional screen where several options are presented. However, the options shown will depend on the access level currently in force.

3.2.3 Hardware > Configure > Power On Preset

This menu allows you to select a preset that will be automatically loaded at power-on; however any changes to this preset will not be saved to the next power-on cycle unless you explicitly do so. If you select the option **Last Setting**, the unit starts with the settings most recently made before it was switched off.

3.2.4 Hardware > Lock Unit

Clicking this menu item will lock/unlock the unit to block unwanted changes. The Locked State is the lowest access level. When locked, the display only shows output levels but no controls or other settings, and nothing can be changed, as shown in figure 10. The actual operation of this function depends on the access level in force as described in section 3.3.3).

An attempt to lock the unit will generate a warning that unlocking will only be possible with a valid password or a password of a higher level. The factory-set password is: **Password**. Users can change this password for each unit individually.
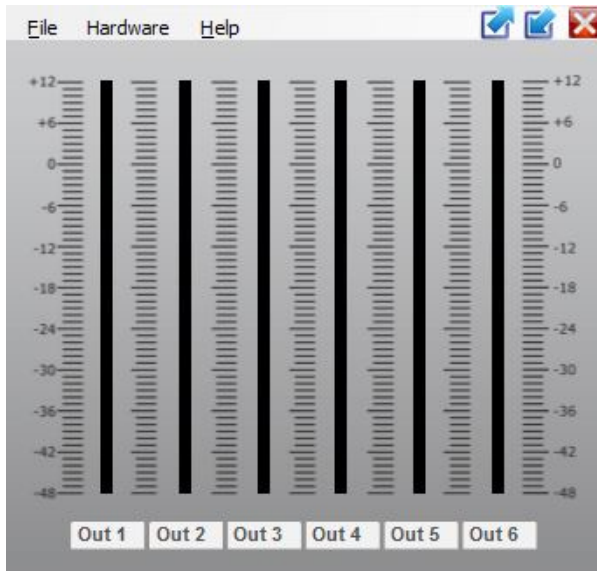
Fig. 10 *"Locked State"*

3.2.5 Hardware > Go to Standby/Exit Standby

Go to Standby will place the unit in standby. In this state, outputs are disabled but all settings can still be manipulated.

To return to the normal mode, call up menu item **Exit Standby**.

3.2.6 Hardware > Set PIN

Clicking this option allows you to enter a 4-digit PIN number. When this is set, you will need to enter the PIN number at any time you attempt to access the software or when the software needs an input. This is a separate function to the access level control. The PIN control can be switched off by entering a PIN of **0000**.

3.3 Access levels and locking

There are up to four access levels with different rights available. The setting options available for users depend on the access rights of the current access level. The levels are accessed by different passwords. These features are in addition to a software password described in section 3.2.6.

3.3.1 Entering passwords

The passwords are entered via menu item **Hardware > Enter Password**. The following table shows the access levels in descending order and the corresponding passwords.

Access level	Password
Development*	develop
Administrator	admin
User	user
Locked State	-

*not DXO-48 PRO MK2

Note: These passwords are factory-set. We suggest changing the passwords after the purchase. Changes can be made in the respective access level or in a higher access level. Store your passwords in a safe place!

At start-up the respective unit will usually be in the access level **User**. There is no specific indication that you are in user mode. However, administrator and developer mode will be indicated at the top of the window. To go to a higher access level, enter the corresponding password.

3.3.2 Changing passwords

To change the passwords, call up menu item **Hardware Hardware > Configure > Change Password**. To change the password of the current level, first enter the current password, then enter the new password, and finally reenter the new password to confirm it. Passwords for lower access levels can be directly entered and will also be displayed.
In the **Development** level, individual presets can be saved with separate passwords. Prior to saving a password, make the desired settings via the menu **Preset > Passwords > Admin Password/Developer Password**.

3.3.3 Changing access rights

Via the menu branch **Hardware** > **Configure** > **Access Rights**, the access rights for lower access levels can be defined. **Figure 12** shows the options and factory-set values for the **Administrator** level.
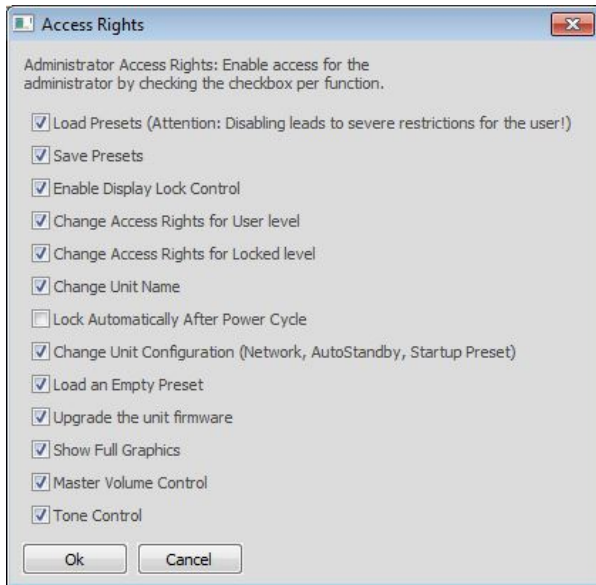

Fig. 12 *Access rights for the Administrator level*

Particular rules apply concerning the access to the settings of the input parameters and output parameters. The access rights for these settings (Access Input/ Output Channel) are exclusively saved on the level **Development** together with the corresponding preset. Prior to saving a preset, make the settings desired via the corresponding menu **Preset** > **Access Rights** > **Locked/User/Admin Access Rights**.

3.3.4 Locking

Call up the menu item **Hardware** > **Lock** to go to the lowest access level **Locked State**.

3.3.5 Configuration suggestions

Go to the menu item **Hardware** > **Configure** to call up specific configuration suggestions.This will preset specific channel linkages and signal assignments by means of the controls MIXER (→chapter 9) that can be used as the basis for further settings.

3.4.6 Configuration of digital inputs

When the signal of the digital input AES / EBU is used for the inputs IN 3 and IN 4 with the DXO-48 PRO MK2, it will be possible to automatically switch to the analog inputs if the digital signal is not available.

Call up the menu item **Hardware** > **Configure** > **AES - > Analog Failover** to enable (on) or disable (off) automatic switching to the analog inputs.

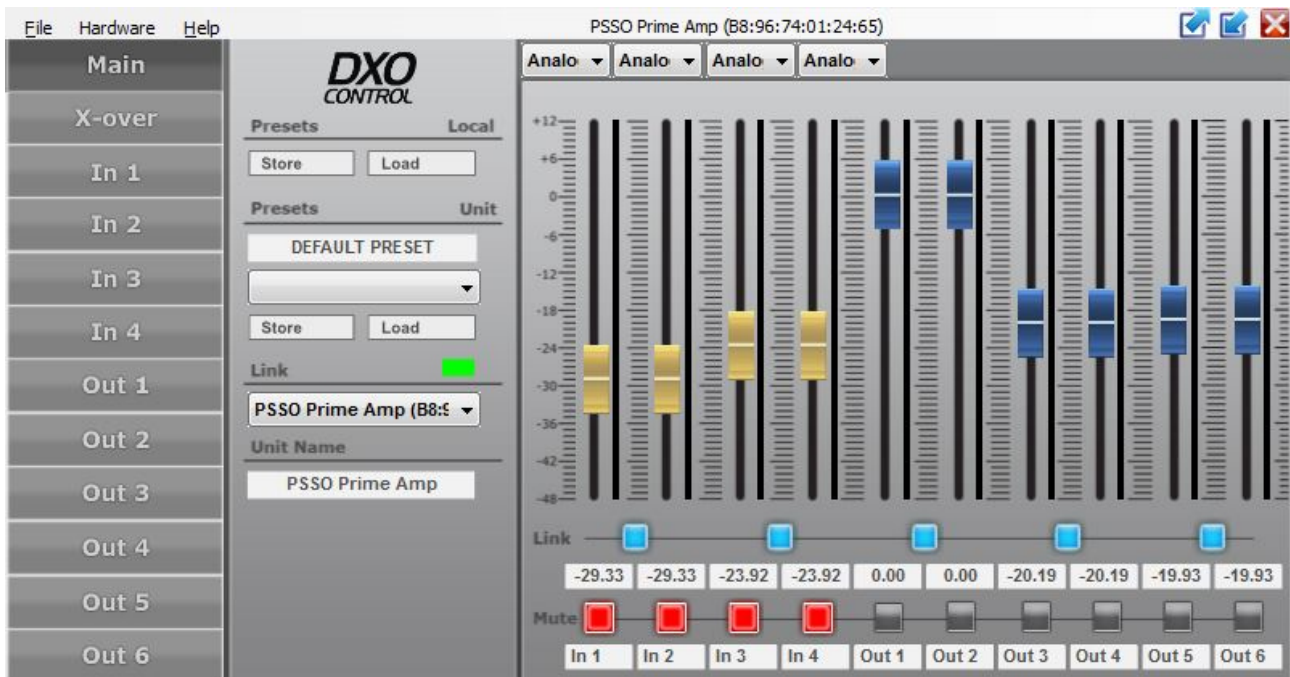# 4 The configuration window: control elements

Fig. 13 *Main setup screen*

The buttons on the left side bar of the main screen can be used to go to the other views, i.e. the crossover settings, the input settings and the output settings (→**Fig. 13**).

4.1 Local presets

These commands allow you to save and re-load configurations as .preset files on the local computer.

4.2 Unit presets

These commands are similar as the other Save and Load commands but with the distinction that presets can be saved to and reloaded from the unit's internal memory. Select the storage location from the list field and enter a name in the upper field.

4.3 Link

Under Link there are several status related indications. The indicator lamp at the right will be green for an active link or red when the unit is offline. The name and MAC address of the connected unit is also shown.

4.4 Unit name

Shows the unit name of the connected unit, which can be edited by typing in a new name. The new name will be reflected in the Link slot as well as in the **device manager** (→**Fig. 3**).

4.5 Channel settings

On the right side are the channel settings. This area is divided into several subsections:

4.5.1 Gain controls for the input channels

These sliders control the level from each of the physical input connectors as send to the input processing channels. Channel numbers are shown at the bottom line. Level settings are also shown numerically below the sliders, and can also be set by entering a specific value in a field.

4.5.2 Gain controls for the output channels

These sliders control the levels for the physical Output channels at the rear-panel output connectors. Level settings are also shown numerically below the sliders, and can also be set by entering a specific value in a field.

Sliders auto-zero: Whenever you double-click on a slider, that slider moves to the 0 dB position. This operates on all views and screens. When two channels are linked, the odd-numbered channel can be used to manipulate the two linked channels. The even-numbered channel of a linked pair will be unresponsive but follow the odd-numbered channel settings. To reset a paired level to 0 dB you must therefore double-click the odd-numbered slider.

4.5.3 Link switch

When activated, level settings for the related pair of channels pairs are linked together and can only be changed with the left-hand, even-numbered slider of the pair. The right-hand slider will follow. Similarly, entering numeric values in the level fields will only be accepted for the left channel of a pair, with the right-channel numeric value following.

4.5.4 Mute switch

Allows muting of an input or output channel on a per-channel basis, independent of any linking in effect.

5 X-over view

Fig. 14 *X-over view*

When you click X-over in the left main screen function list, most of the screen is dedicated to the controls and indicators for setting up the crossover filters as shown in **figure 14**.

The graphical screen shows the crossover settings for each of the output channels in dedicated colors. The cut-off frequencies are represented by triangular marking above the curve. To change the frequency, move the corresponding marking with the mouse (as an alternative to the numeric input). The available range is from 20 Hz to 20 kHz.

5.1 Filter type

The filter type and slope for each output channel and at each end of the band can be set by selecting the desired type from the drop-down menu below the graphical area, for that channel. Separate filter types are available for the HP and the LP setting.

5.2 Gain

The output channel gain, in dB, can be set by entering a numerical value in the field indicated by 'G'. The gain value entered here will have the same effect as in the main view.

5.3 Delay

For each channel a delay can be introduced in the numeric field indicated by 'D', in milliseconds.

5.4 Link

When two channels are linked by activating the related link button in the top right-hand side of the screen, the settings for that pair are combined and only a single color and number icon for the pair is shown in the graphical screen (only the odd number of the pair is shown). Also in this case, all numerical values and filter types for the two channels are linked and can only be changed in the left hand side (odd numbered) channel of the linked pair.

5.5 Mute and phase invert

Changes to the mute status of a channel or channel pair will also reflect in the main screen and vice versa. Mute status of an individual channel can be changed independent of whether a channel is linked to another channel. However, the phase invert status will be linked for two channels if the channels are linked.
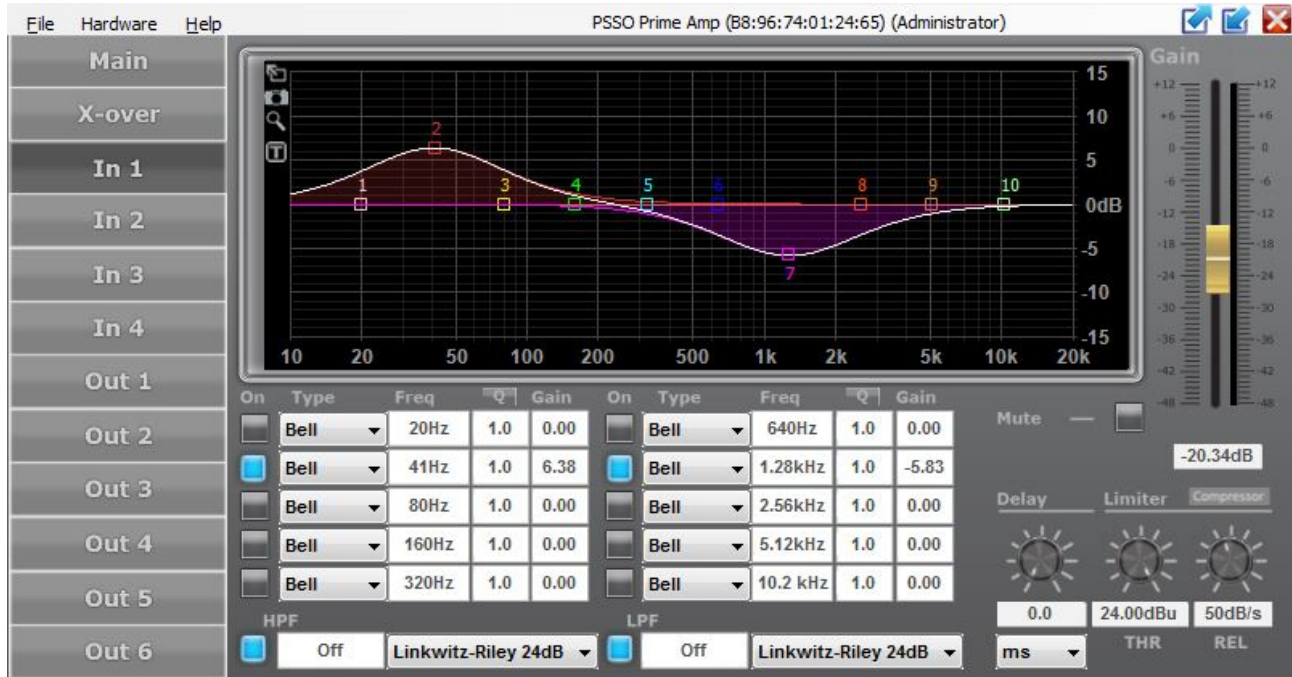
6 Input channel view

Fig. 15 *Input channel view*

Clicking on an input channel number in the main screen will bring up the input channel screen (→**Fig. 15**). In this screen, individual input channels can be equalized and/or filtered.

6.1 Filtering and EQ

All input channels can have filtering and equalization applied individually, or as linked pairs. Input channels can be linked in the min screen, and in that case, all EQ and filter settings for the pair will be linked. EQ can be set either in the graphical screen by cursor dragging, or in the numerical fields and drop-down lists below the graphical screen. Type, Frequency, Q/BW and Gain can be set for each input or pair of linked inputs. All settings are reflected real-time in the graphical screen. The Q/BW column toggles from indicating filter Q or filter bandwidth (BW) every time the column label is clicked.

6.2 Curve diagram

On the graphical screen, a white curve represents the compound transfer curve for that input channel. Each filter has a point of reference (small square with filter number) and a frequency curve in a specific color. The frequency response resulting from all active filters is represented by a white curve. Some of the filters can be set graphically via the mouse:

– move horizontally to change the frequency
– move vertically to change the gain
– move horizontally with the right mouse button to change the quality factor/bandwidth
– double-click a point of reference to switch the corresponding filter on or off

Alternatively, you can either click the black/blue button next to each EQ or the HPF or LPF filter at the bottom of the screen, or you can double-click on the numbered square of the elements in the graphical screen. Even if the effect of the element on the compound curve is removed, the colored contributing curve of the element remains visible. This is a useful functionality to review the contribution of several interacting filter and EQ settings on a channel.

The actual contribution of an element is always reflected in the blue on/off button next to each element.

Note: The white compound transfer curve also reflects any crossover settings made in the X-over screen, when activated at the HPF and LPF buttons at the bottom of the screen.

6.3 Tools

On the left-hand side of the graphical screen are four icons to help precise settings. The top **Arrow** icon expands the graphical screen to the size of the window. Clicking this icon again from the expanded screen expands it to the full display size. In either of the expanded settings, clicking the **X**-icon at the top left will collapse the graphical area to the default setting.

The **camera** icon will generate a .png picture file similar to a screen shot which you can save for documentation or instruction purposes.

The **T(ext)** icon will show/hide the values of all active filters in the graphical screen. These settings will anyway be visible when changes are being made, but with the T icon activated, they will be visible continuously. This duplicates the numerical indications in the lower part of the screen but it will be useful with the expanded screens mentioned before.

For very accurate settings of EQ or filtering you can click the **looking glass** icon. All movements of the cursor now have a much smaller effect and you can drag curves with much greater precision. Clicking the looking glass again reverts to normal operation.

The **bottom symbol** opens the RTA function (→chapter 7).

6.4   Input gain and mute

The right hand side of the screen shows the slider to set input channel gain and, next to it the level indicator. The field for numerical input of the gain value is below the control. The mute button mutes the corresponding input. Settings in this view have the same effect as in the main view.

6.5   Delay, limiter and compressor

In the bottom right of the input screen there are settings for channel delay, limiter (-46 to +24 dBu) and compressor release rate (13 to 99 dB/s) settings. Channel delay can be set in a variety of distance or time units from the drop-down list.

7 Using the RTA function

The RTA enables you to visualize the spectrum of the audio signal. By using this to measure the output of the loudspeaker producing white noise, you can find the transfer curve of the loudspeaker. Although other applications exist, we will focus on this application. To measure a transfer curve, connect a signal generator playing white noise, or select "White Noise" from the input selection drop-down in the DXO Control software. Adjust the volume to a reasonable level; there is no need for high SPL measurements unless you want to test power compression. Now go into the channel you want to adjust. For a 2-way system this may be the HF or LF channel, or it may be the input channel to adjust the overall transfer function. If you plan to use the RTA measurement to control a FIR filter, choose a channel that supports FIR.

7.1 RTA measurement

First you need to enable the RTA function. To do so, click the RTA icon in the graphical window.
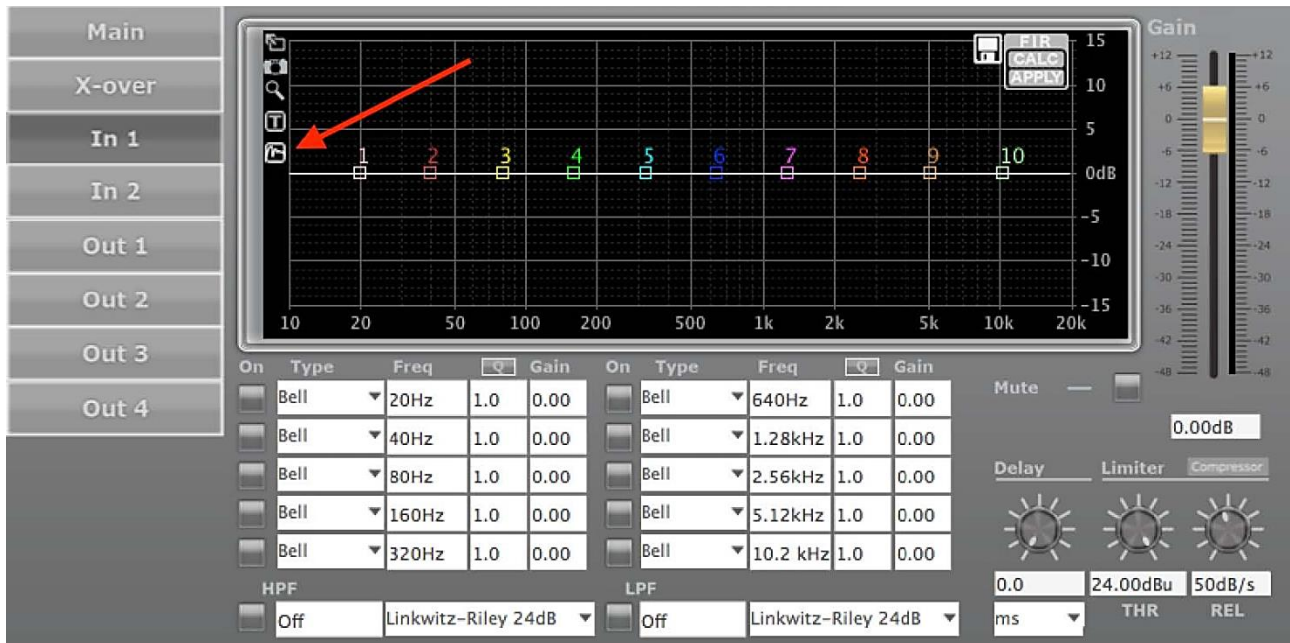
Fig. 16 *RTA symbol*

Note: DXO Control provides FIR calculation functions for hardware that supports FIR filters, and an RTA (Real Time Analyzer) option that can be used in combination with the FIR filter, but is independent from the hardware. This document describes the use of both options. It is assumed that you know what a FIR filter is, what the difference between IIR and FIR filters is and that you understand the concepts of truncating, convolution, group delay and related topics, as well as transfer function, power compression, directivity etc.

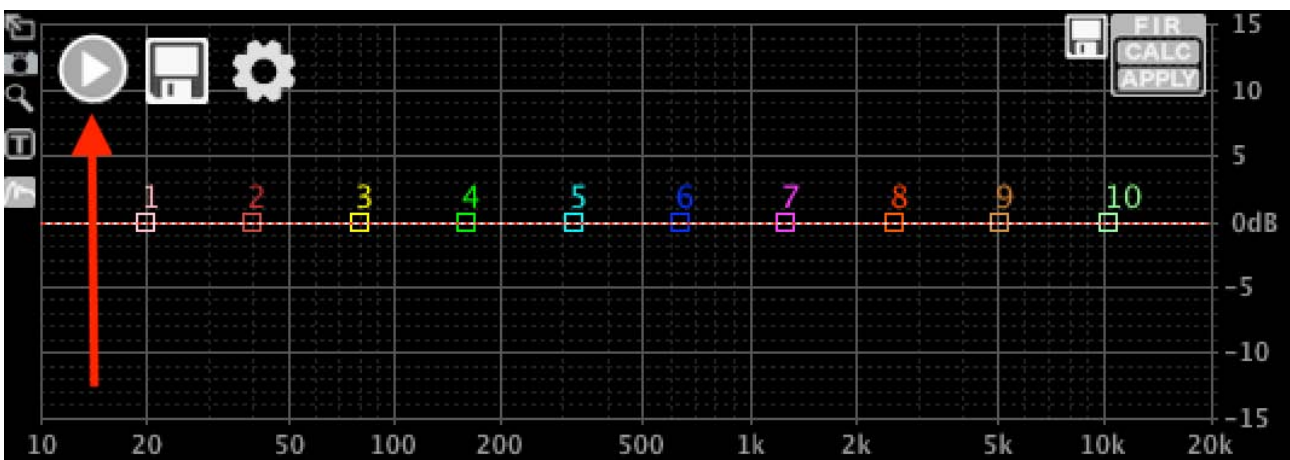The RTA function will be enabled. To start the measurement, click Play.

Fig. 17 *Play*

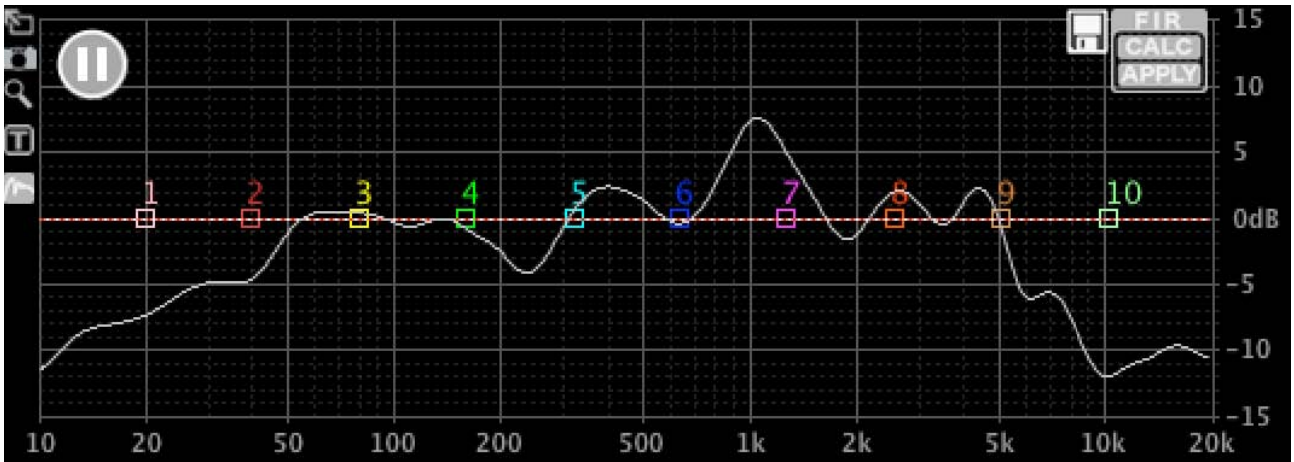This will start the RTA with the default settings. A measured response will be shown:

Fig. 18 *Measured response*

Click Pause to stop measuring.

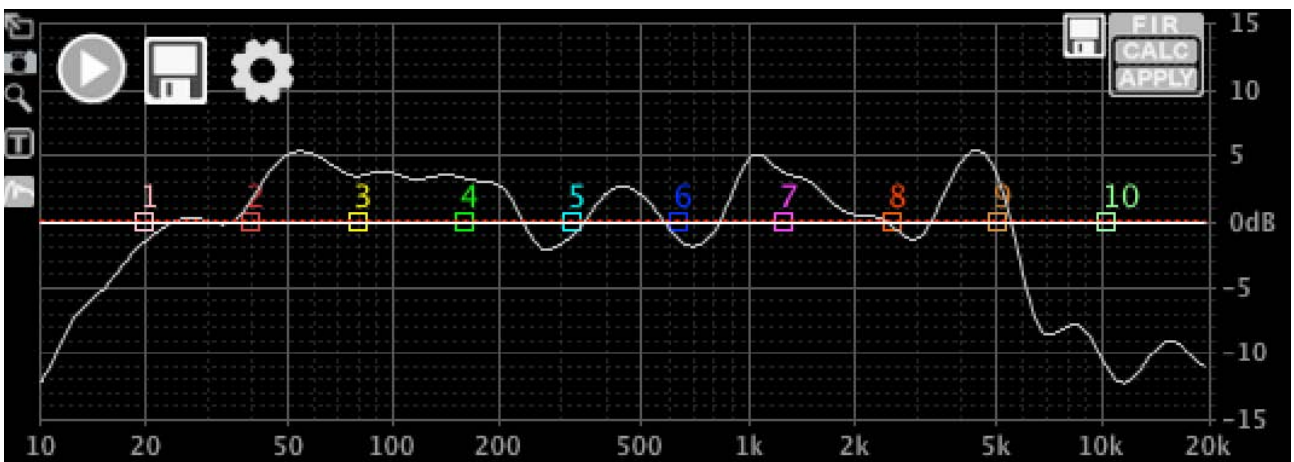***Fig. 19*** *Stop measurement*

7.2   Measurement options

Now that you have made a first measurement, let's have a look at the measurement options. Click the Settings button.
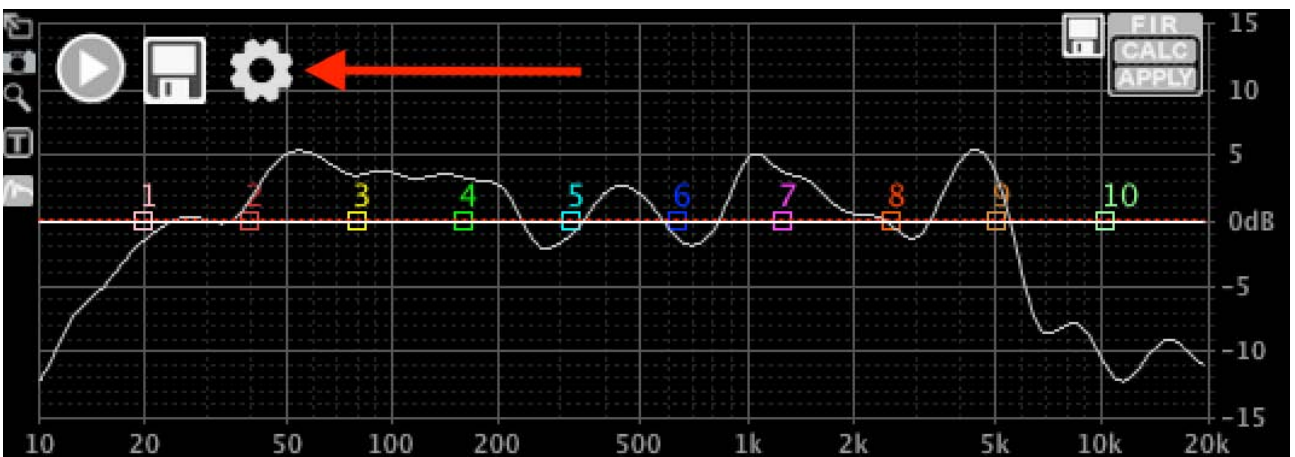

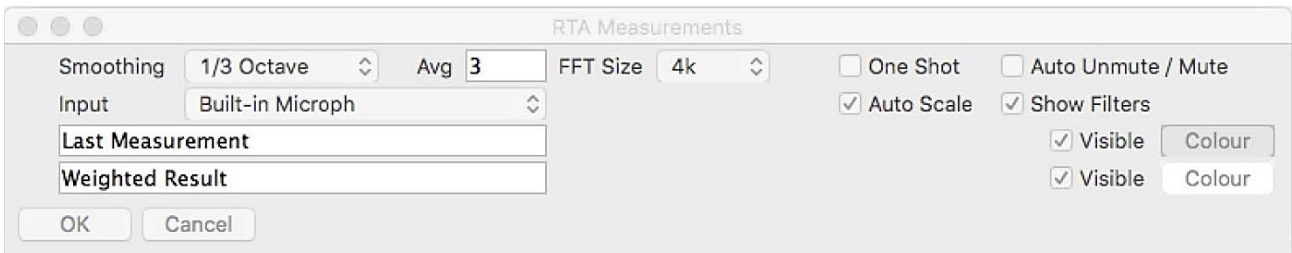***Fig. 20*** *Options*

A window will open with the measurement options:

Fig. 21 Options dialog

Option	Function
Smoothing	Choose the frequency smoothing. For manual measurements and settings, 1/6th or 1/3 Octave is recommended. For automatic FIR adjustment, this may lead to unexpected results due to room interference; in this case, a setting of 1/2 to 1 Oct is recommended.
Avg	Choose the number of measurements that are averaged. The averaging function is a moving average over Avg samples. For fast indications, 1 to 5 is OK; for accurate measurements, you may want to increase this value to 10 or more.
FFT size	The size (length) of the sampled data. With a size of 4k, lower frequencies are not accurately measured, but the measurement is fast. Larger size leads to more accuracy in the low region, but longer measurement times. To see the accuracy, try setting the smoothing to "Off"; then you will see the actual data points.
One Shot	When selected, one reading consisting of "Avg" measurements will be taken. When deselected, the measurement is continuous.
Auto Mute / Unmute	When selected, the software will automatically mute the hardware at the end of each measurement, and unmute it before the next measurement. Use this in combination with the One Shot setting to go easy on your neighbors.
Input	Select the source of the measurement. A proper measurement microphone is recommended; the measurement is only as good as the microphone.
Auto Scale	Manual scale is not supported yet. Please leave this check box selected.
Show Filters	Wenn diese Option abgewählt ist, werden die Frequenzgangkurven der Filter (PEQ, HPF, LPF, FIR) nicht angezeigt. Unterhalb der Optionen wird eine Liste der gespeicherten Messungen angezeigt. Wenn noch keine Messungen gespeichert wurden, werden nur die Standardkurven angezeigt: **Last Measurement** This is the as-yet-not-saved measurement. Select if it is visible or not by clicking "Visible"; select the color by clicking "Colour". **Weighted Result** When saving multiple measurements, these can be combined into one. Select visibility and color here. Feel free to play around; it will not explode

7.3   Saving and combining multiple measurements

After making a measurement, look at the curve and see if it is plausible. Measurements can be distorted by nearby objects (walls, floor, people, bookshelves). Try measurements in different places to see what happens. When you are satisfied with a measurement, click the Save button.
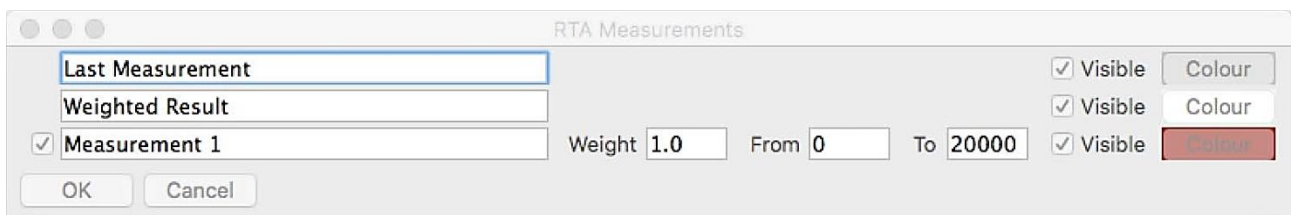

Fig. 22 Storing measurements

One more line is added to the measurements. You can set some options:

Option	Function
Enabled	When deselected, this measurement will not be visible and will not be taken into account for the weighted result.
Name	You can set the name for each measurement.
Weight	The weight of each measurement determines the relative importance of each measurement when calculating the weighted result. For instance: When you have one measurement with weight 2 and another with weight 1, the first measurement will be twice as influential in the result. Choose any number other than zero.
From	The bottom end of the frequency range where this measurement is used. More on this on the next page.
To	The top end of the frequency range where this measurement is used. More on this on the next page.
Visible	When deselected, the measurement will not be visible, but will still be taken into account for the weighted result.
Colour	Select the colour of the displayed curve plot.

Normally, one would make several measurements, e.g. for different listening positions to take the room into account, or from different angles w.r.t. the loudspeaker to take the directivity of the loudspeaker into account. We will not go into the details of why and how to measure for optimal results; that is not the scope of this document, and there is plenty of information on that in the Internet.

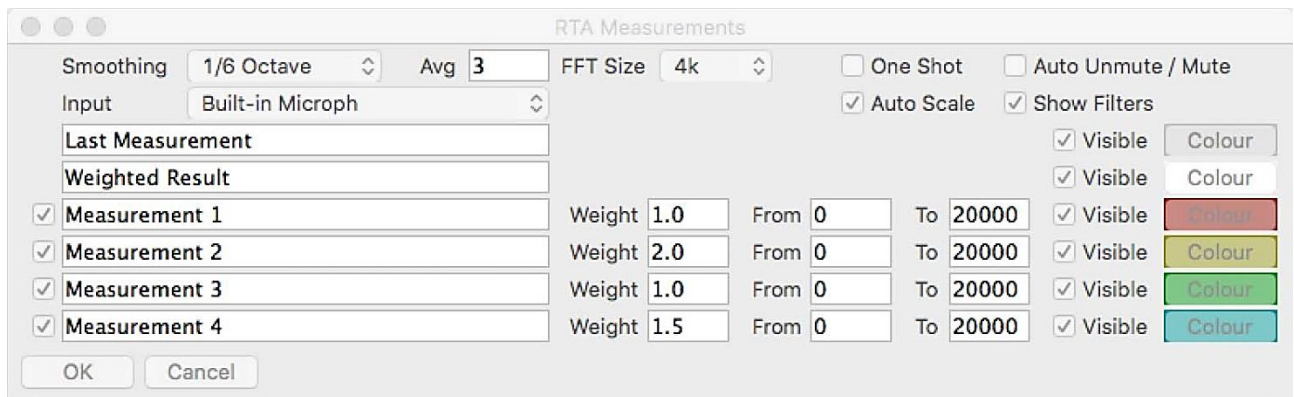After saving several measurements, the **Settings** window looks like this.

Fig. 23 *Storing several measurements*

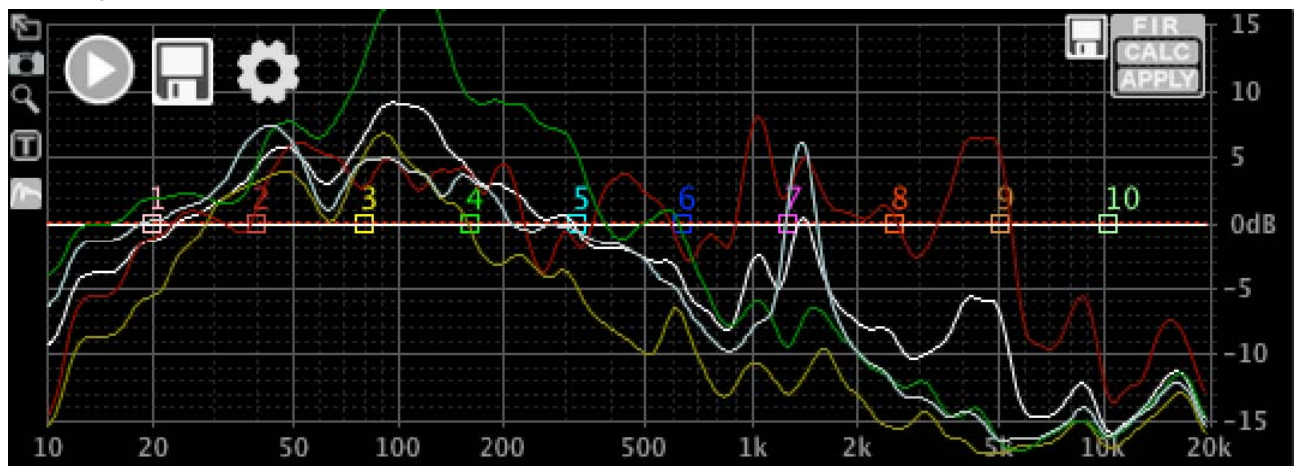And the graphical window will look like this:

Fig. 24 *Displaying several measurements*

Now you can combine these measurements into one averaged result. In the image above, measurements 2 and 4 have a greater weight than the other two; these would be e.g. on-axis results, or my favorite listening position. Now let's assume that measurement 4 (the blue one, also the last one, so shown light grey here) was done close to the woofer, and I think this data is very useful for the low end up to 300Hz, but irrelevant for the rest of the frequency spectrum; and the other measurements are relevant for 300Hz and higher.

"From" and "To" fields are displayed as follows:

	Last Measurement					☐ Visible	Colour
	Weighted Result					☑ Visible	Colour
☑	Measurement 1	Weight 1.0	From 300	To 20000		☑ Visible	Colour
☑	Measurement 2	Weight 2.0	From 300	To 20000		☑ Visible	Colour
☑	Measurement 3	Weight 1.0	From 300	To 20000		☑ Visible	Colour
☑	Measurement 4	Weight 1.5	From 0	To 300		☑ Visible	Colour

Fig. 25 *Editing*

The Last Measurement is set to invisible so as not to be in the way, since measuring is done for now.
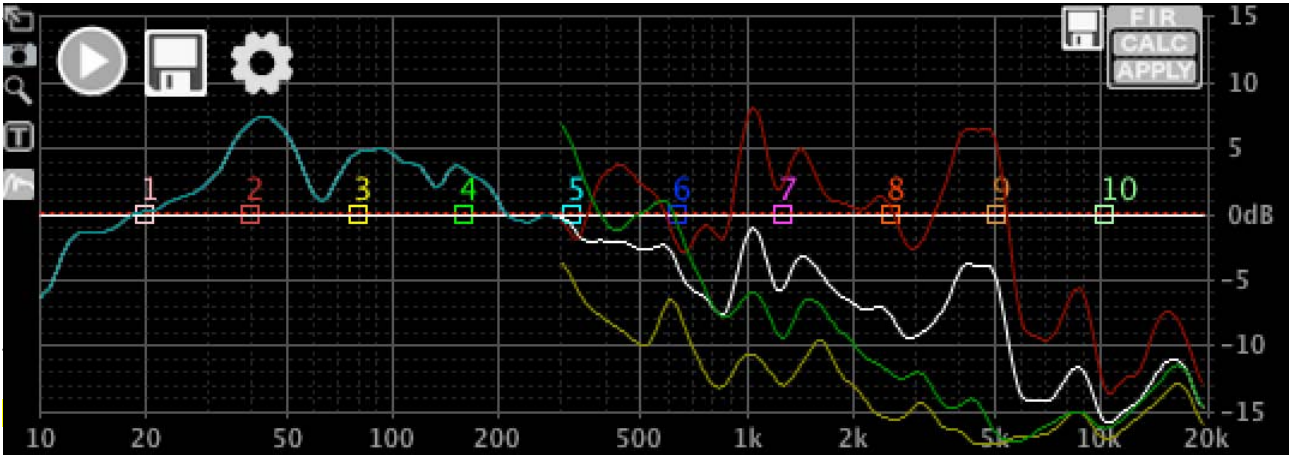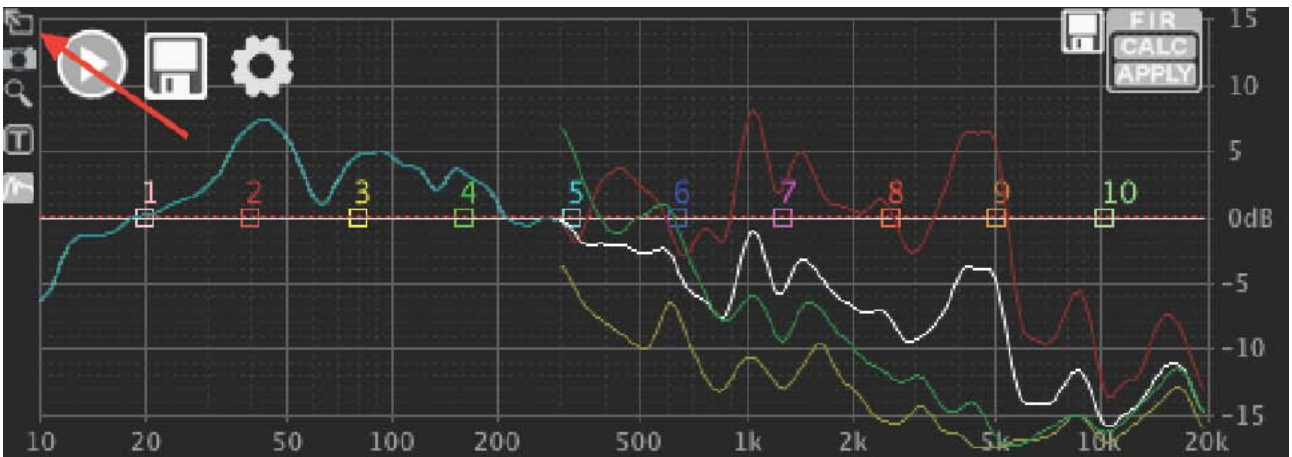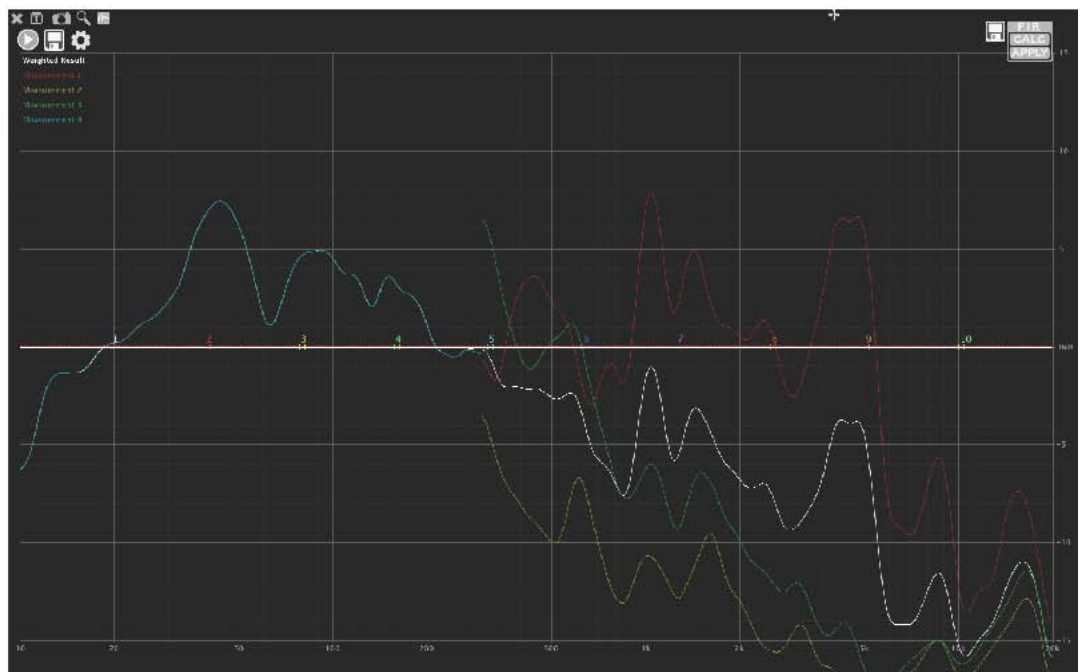

Fig. 26 *Invisible measurement*

Fig. 27 *Full-screen mode*

The graphical window will fill the size of the unit panel. Click the same button again to use the whole display area for maximum detail.

You can play around with different frequency and weight settings to reach the desired weighted result. One more example: Settings.
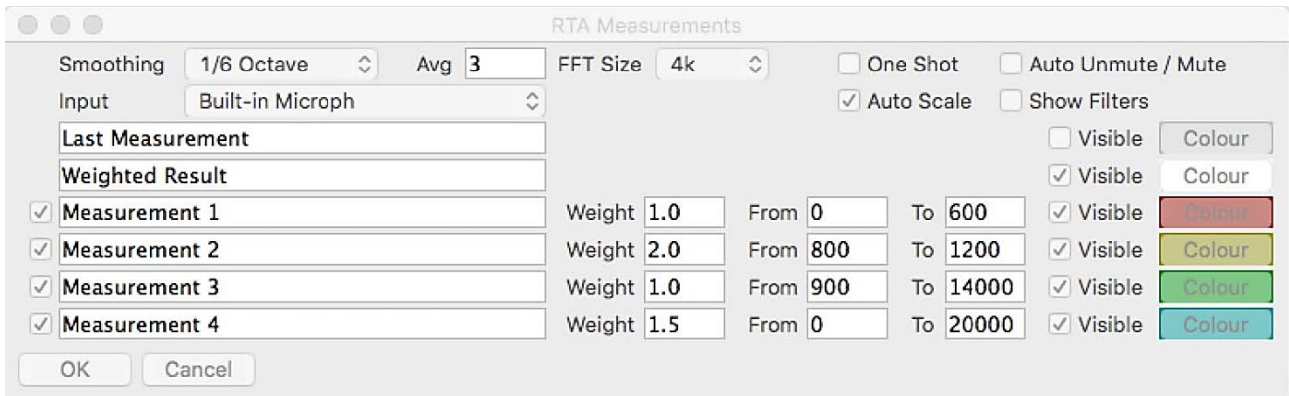

Fig. 28 *Settings dialog*

And the result:

Fig. 29 *Results*
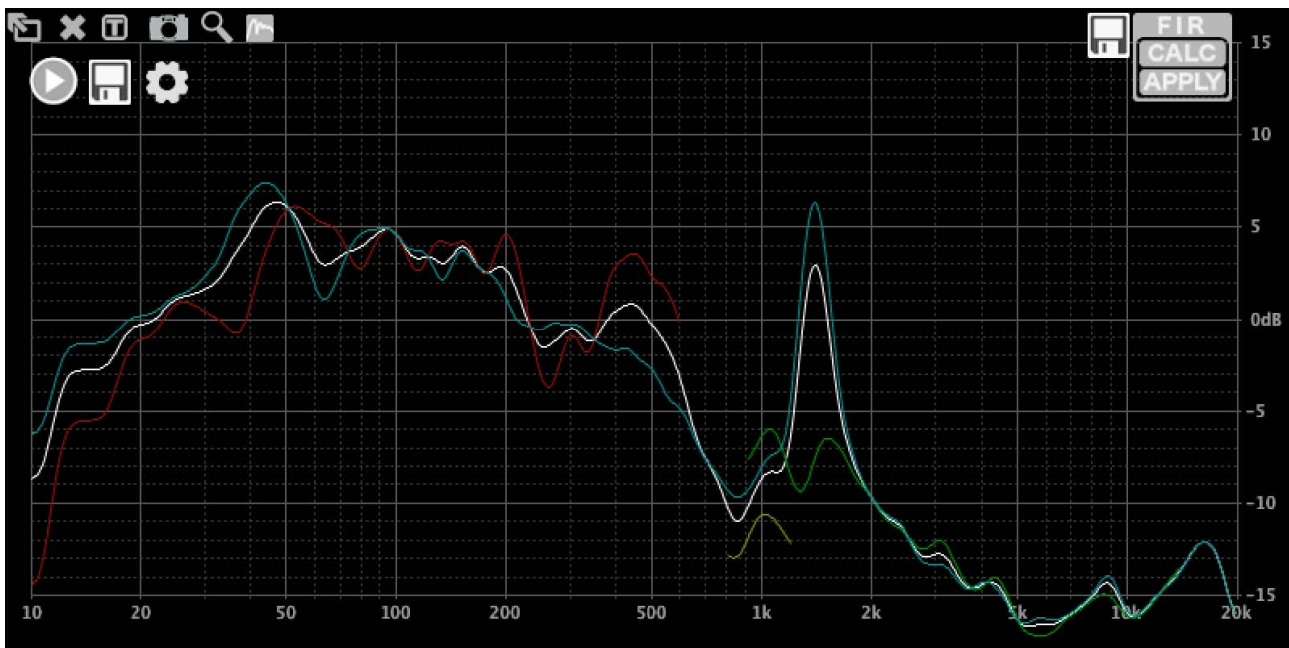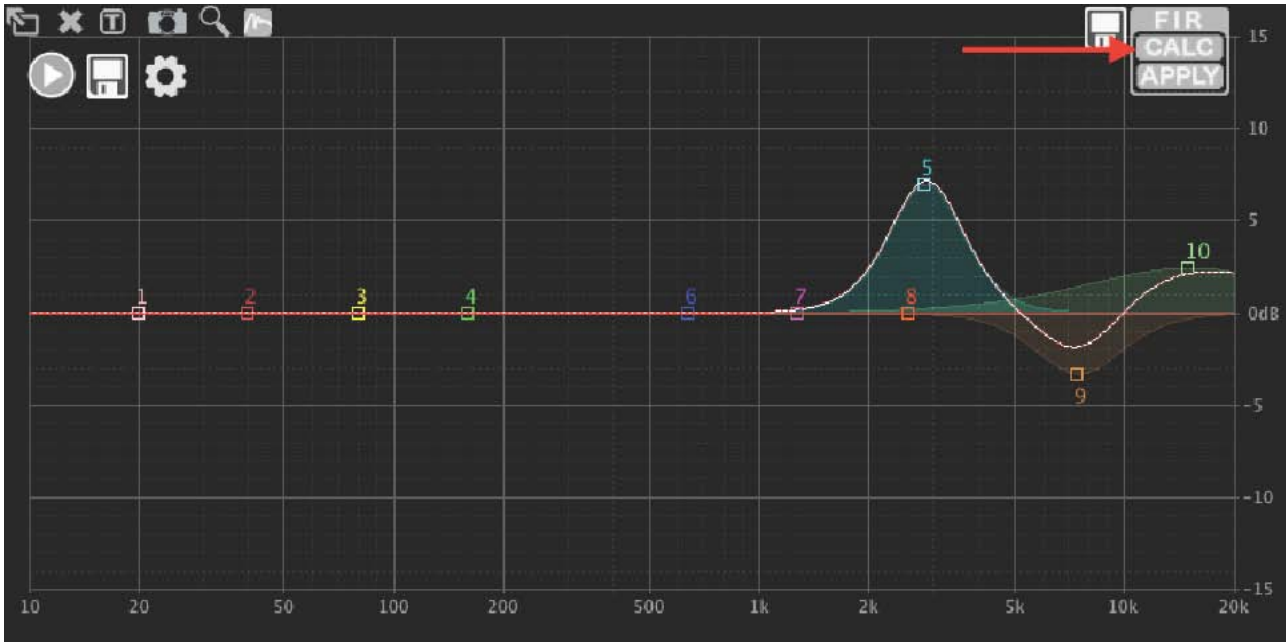
8 Using FIR filters

There are 3 ways to define a FIR filter in DXO Control: Load from a file, create by using PEQs and crossovers to draw a target response, and by inverting the RTA measurement.

When a unit is connected, the filter that is loaded will be shown on the display as a white line. In this example, no FIR filter has been loaded yet. Let's change that, shall we?

8.1 Creating a filter from parametric equalizers

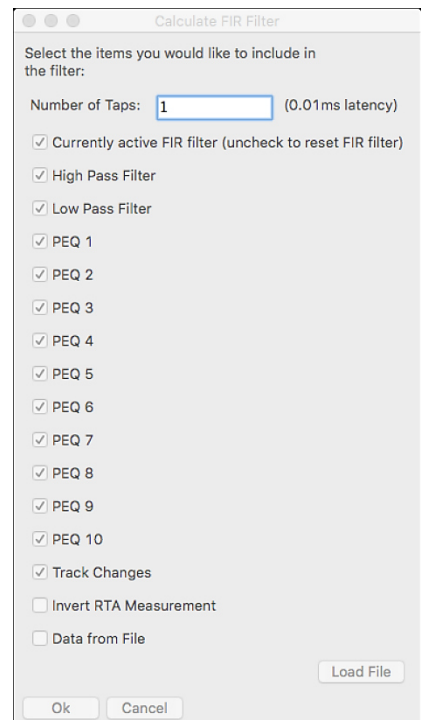First, set some PEQs to create a target response, then click **CALC** in the FIR corner:

Fig. 30 *Open CALC dialog*

A pop-up window will appear with some options:

Option	Function
Number of taps	You can select how many taps of the FIR filter are used. More taps means more accuracy in the low end, but also means that the filter will cause more latency. The filters we generate are all linear phase with a symmetrical impulse response, and the latency is therefore equal to half of the filter length.
Currently active filter	You can add to the filter that is currently active in the hardware, or you can start from scratch by deselecting this option.
HPF, LPF and PEQs	You can choose which filter will be converted to FIR and which will be ignored. It is common practice to use IIR for low frequencies and FIR for higher frequencies to keep the latency down to a minimum.
Track changes	The FIR calculation will be updated automatically as you change PEQs.
Invert RTA measurement	→section 8.2
Data from File	→section 8.4

Select 256 taps (the maximum number for the hardware that is used for this example), deselect **Currently Active FIR Filter** and click **OK**. In the graphical screen you will see a dotted red line indicating the calculated FIR response. As you can see in the screenshot above, it is perfect as far as the display resolution allows us to see. The red dotted line is the calculated response from the FIR coefficients; so any deviations will be visible here. This becomes clear when we try to use this FIR filter to change the low frequency response:

Fig. 31 *Calculated FIR response*

As you can see, the deviation below 200Hz is quite serious. In other words: A 256 tap FIR filter is useless in this frequency region. Which is to be expected, it is caused by the "finite" in the name FIR. You can use the red dotted line to see the result of the approximation

8.2   Inverting the RTA measurement

We can also create a filter by inverting the RTA measurement. Using the measurement we did in the previous chapter, the result looks like this:
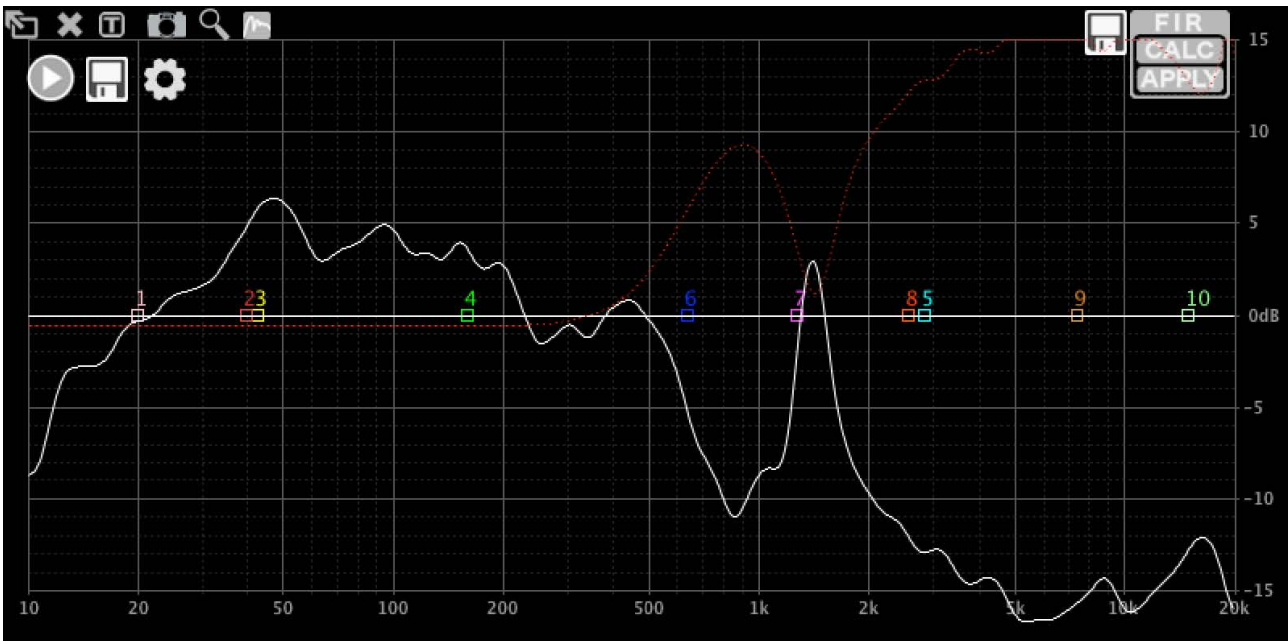
Fig. 32 *Inverted RTA measurement*

As you can see, it only works above appr. 300Hz. Below that, the response is automatically reduced, taking the amount of taps into account. The red dotted line again shows the expected response

8.3   Loading a filter from a file

Click **CALC**, then **Load File**. Select your file. If the number of taps in the file fit in the FIR filter, it will be loaded automatically. If the number of taps exceeds the available filter size, the filter will be truncated. ALLCONTROL supports 24 and 32 bit fixed point files, and floating point files. Any lines that do not contain a number (such as comments) will be ignored. You can generate FIR files with many 3rd party programs, or even online. Here is a 1k HPF, generated with ScopeFIR:
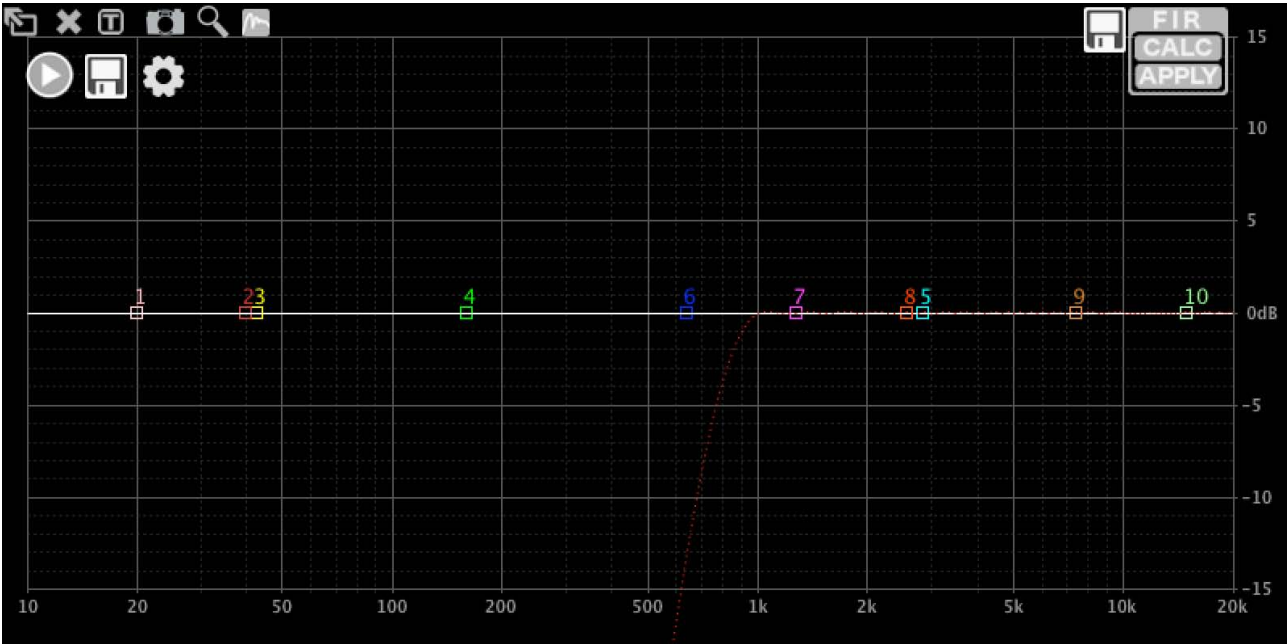

Fig. 33 Loading a file

Again, the dotted red line indicates the calculated frequency response.

8.4   Sending a filter to the hardware

When you are satisfied with the response indicated by the red dotted line, click **APPLY** to send the filter to the hardware. A window will appear with two options:

Reset converted IIR filters: When selected, the software will automatically disable the IIR filters that were converted to FIR.

Do not show this dialog again: Speaks for itself, doesn't it?
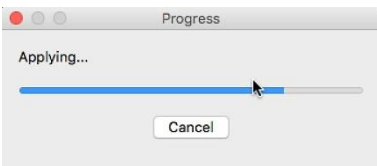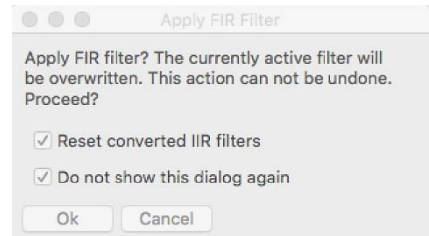
The communication can take some time to complete, depending on filter size and connection speed.

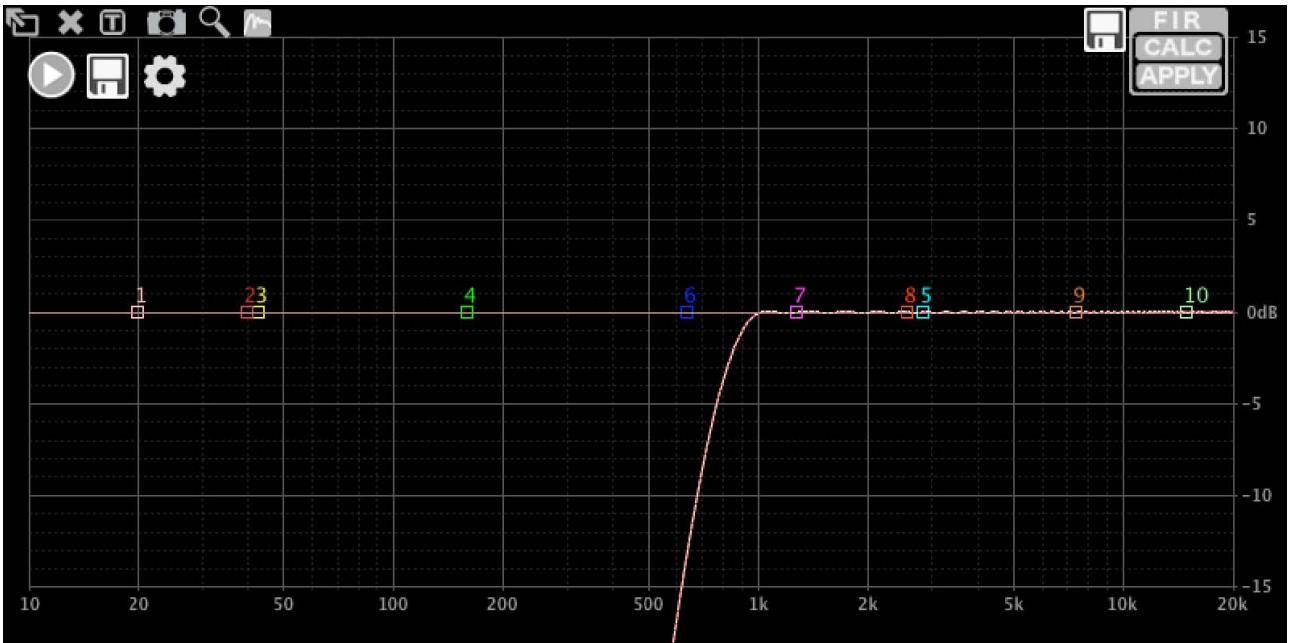If no other filters are active, the response will be shown as a white line:

Fig. 34 Response

When you add PEQs now, you will see the white line will follow the PEQs, as well as the red dotted line; the red dotted line is the newly calculated FIR filter, following the changes you are doing with PEQs, and the white line is the overall frequency response. If some PEQs are not taken into account in the FIR calculation, the white line will include them (because that is the overall frequency response) but the red dotted line will not. There will also be a solid red line, which is the response of the FIR filter that is currently loaded in the hardware:
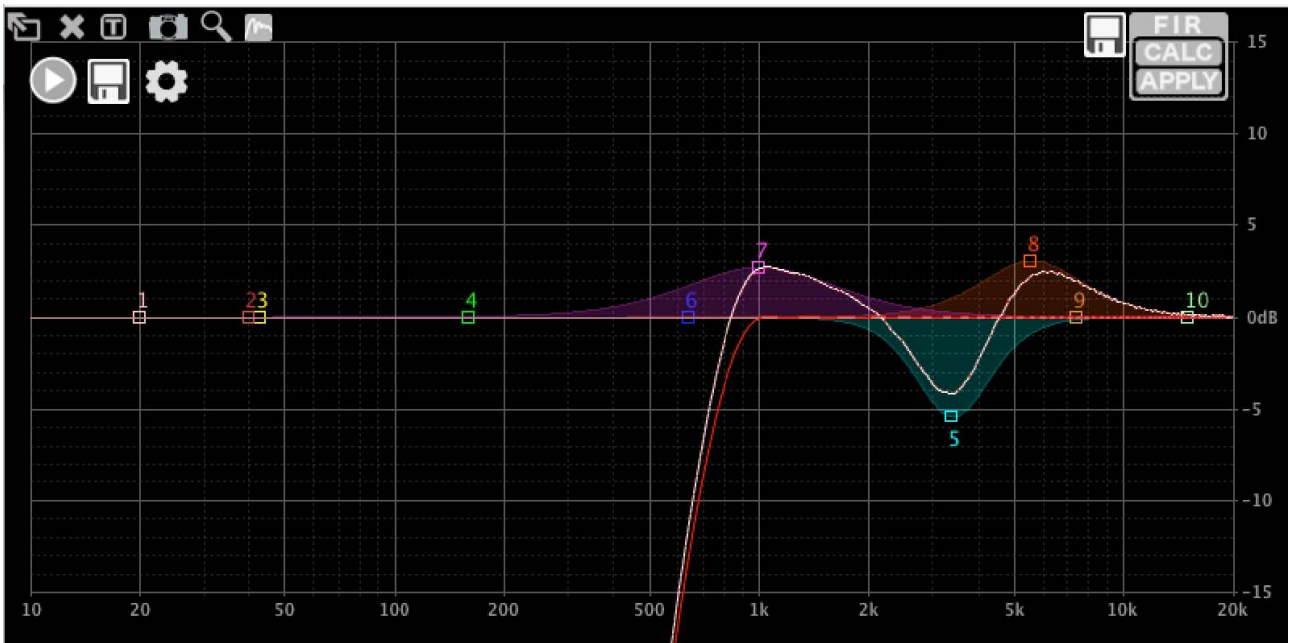

Fig. 35 PEQ points

8.5 Saving files

Click the disk icon next to the FIR block to save a filter as a text file. The filter that is loaded in the hardware will be saved to disk, and can be loaded into other channels or saved for later use. Here is the FIR file of this example (omitting most coefficients):

FIR filter generated by DXO Control. Sample rate: 48828 Hz, 255 taps
-0.00251117721317
0.000136785209243
0.000140666030413
0.000148858875106
0.000161494128481
0.000177634880029
0.000197263434621
0.000219509005649
0.00024409592163
0.000270059332377
0.000297261402149
0.00032448116705
0.000351532362565
0.000377209857282
0.000401332974621
0.000422636978525
0.000440970994737
0.000454998575363
0.000464653596498
0.000468616374055
0.000467024743774
0.000458568334793
0.000443564728109
0.00042071472873
0.00039056222904
0.000351847149596
0.000305717811131
0.000250644981978
0.000188274309127
0.000117114745135
3.95923853105e-05
-4.697032275e-05
-0.000135075300995
-0.000237385742477
-0.000340500846664
-0.000444556586651
-0.000553787686189
-0.000663964078139
-0.000775675289694
-0.000885844231064
-0.000994163565801
-0.00109791569463
-0.00119658745881

Note: We believe that these functions provide you with powerful tools to use FIR filters and RTA measurements conveniently. Development is ongoing, so functionality will be added in the future. The examples in this document were made with software version 3.8.23 build 117010. Earlier software versions will have more limited functionality. Please always upgrade to the latest version as found on the product page at https://www.psso.de.
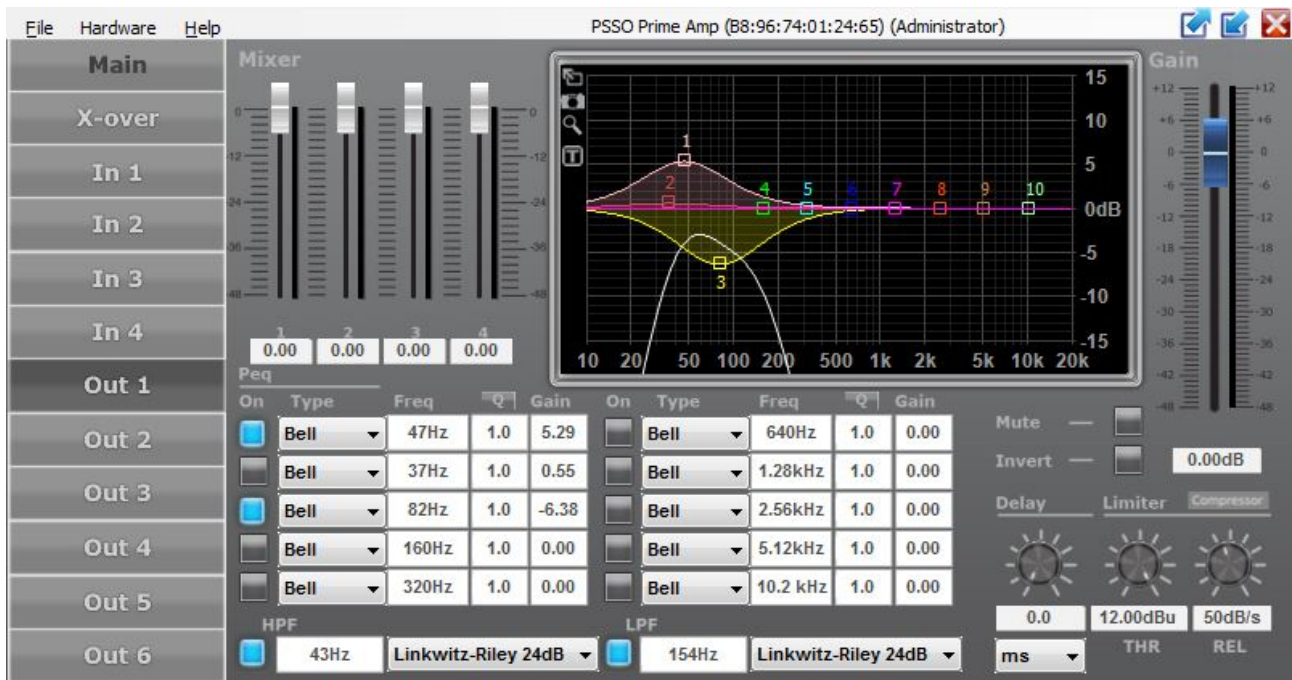
9   Output channel view

Fig. 36 *Output channel input mixing*

To the left of an output channel graphical screen, level sliders are shown for each of the input channels (→**Fig. 36)**. This will allow mixing each of the input signals to each individual output channel. Even if Input channels are set to linked in the main screen, it is still possible here to mix individual input channels to an output channel in any desired ratio. Level setting is shown numerically below each slider. The available range is from 0 dB to -48 dB. As in other screen, double-clicking a slider resets it to 0 dB.

9.1   Graphical screen

A curve diagram of the magnitude frequency response is available for each output channel. The graphical area reflects the crossover settings for the channel in addition to any equalization settings set up in this screen, and is very similar to the available settings in the individual Input channel screens. The status of a parameter is always reflected in the blue on/off button next to each element.

9.2   Relationship between input and output settings

At the bottom of the output channel settings screen you will see the high-pass and low-pass settings from the crossover settings for the particular output channel repeated (→**Fig. 14)**. Both the slope and the filter type are shown, and the curves are also shown in the output graphic screen. Any changes you make here are also reflected in the X-over screen. This way, you have control over the main crossover settings as well as the EQ and filtering for a specific output from a single screen. In contrast, the crossover screen gives you the overview of all crossover settings for all channels in a single screen. Both the HPF and LPF filter can be permanently disabled here of course, and that this will then also be reflected in the X-over screen.

9.3   Output filtering and EQ

Similarly as described for the input channels, each output channel can have up to 10 equalizers and filters attached to it. Note that all outputs can be configured individually independently from whether they have been linked elsewhere.

Each EQ can be set in the graphical screen by dragging the appropriate EQ number as described earlier, as well as by entering the desired numerical values in the fields. When using the mouse to drag settings, the actual numerical values for Gain, Q or BW and Frequency are shown in the screen. In addition, the four icons in the top left area of the screen (expansion arrow, camera, 'T' and Looking Glass) act as described for the input screen.

9.4   Curve diagram

On the graphical screen, a white curve shows the compound transfer curve for that output channel. Each filter has a point of reference (small square with filter number) and a frequency curve in a specific color. Some of the filters can be set graphically via the mouse.

There are two ways to toggle the contribution of an EQ or crossover element on the white compound curve on or off. You can either click the black/blue button next to each EQ or the HP or LP filter at the bottom of the screen, or you can double-click on the numbered square of the elements in the graphical screen. Even if the effect of the element on the compound curve is removed, the colored contributing curve of the element remains visible. This is a useful functionality to review the contribution of several interacting filter and EQ settings on a channel.

9.5   Delay, limiter and compressor

In the bottom right of the output screen there are settings for output delay, limiter (-46 to +24 dBu) and compressor release rate (13 to 99 dB/s) settings. Channel delay can be set in a variety of distance or time units from the drop-down list.

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