



# **CONEQ™ COMPATIBLE Program**

## **USER'S GUIDE**

v1.0

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## OVERVIEW

Real Sound Lab's CONEQ™ is a technology to measure and equalize the acoustic power frequency response (APFR) of electro-acoustic transducer devices, such as loudspeakers. With CONEQ™ every loudspeaker sounds better – clear, natural, and without attenuations – within its whole frequency range. The CONEQ™ technology is applied in two steps. First, a precise measurement of how well the loudspeaker transmits energy at each frequency is done and a compensation filter is automatically produced. Second, the filter is applied to the audio signal by any of the software or hardware tools supporting CONEQ™.

Traditionally, the equalization was applied by dedicated software or hardware tools offered by Real Sound Lab. This is still a good option for many cases. However, third party signal processing products have become more powerful and more configurable and in some circumstances are perfectly suited for applying the CONEQ™ equalization filters besides the other classic processing algorithms like mixers, crossovers, limiters and so on. Doing everything in one product would save on space, installation time, and the total unit cost.

Therefore, Real Sound Lab is introducing the CONEQ™ COMPATIBLE certification program for third party hardware and software products. To be qualified for CONEQ™ COMPATIBLE certification, a product must be able to employ at least 1024-tap CONEQ™ equalization filters (finite impulse response filters) and this capability must be verified by Real Sound Lab.

CONEQ™ equalization filters are created in the CONEQ™ Workshop measurement software and exported by a dedicated module in a format that is usable in third party products. Use of this module requires a special software license.

The current document describes the process of creating CONEQ™ COMPATIBLE filters, lists all currently certified CONEQ™ COMPATIBLE products, and shows how to use CONEQ™ COMPATIBLE filters in these products. It assumes prior knowledge of the CONEQ™ technology and CONEQ™ Workshop software.

## PREPARING CONEQ™ COMPATIBLE FILTERS

Starting with version 3.2.0, the CONEQ™ Workshop application provides means to create CONEQ™ equalization filters that are targeted at third party products.

To create a CONEQ™ COMPATIBLE filter, select one of the two CONEQ™ COMPATIBLE options in the list of intended equalizer types supported by CONEQ™ Workshop. The figure 1 shows the available choices.

Which of the two CONEQ™ COMPATIBLE entries to select depends on the desired filter resolution. The 4096 tap filters have 5 Hz resolution but 1024 tap filters – 20 Hz resolution. This means that low frequencies below about 100 Hz are equalized less precisely by the 1024 tap filter. Thus, if the processing power and the configuration software of the CONEQ™ COMPATIBLE product allows it, use 4096 tap filters. See the sections describing each CONEQ™ COMPATIBLE product to see the available computing power.

Choose the filter sample rate that matches the sample rate of the audio signal to which the filter will be applied.

Click **Recalculate filter** button to create a filter that can be exported as a CONEQ™ COMPATIBLE filter.

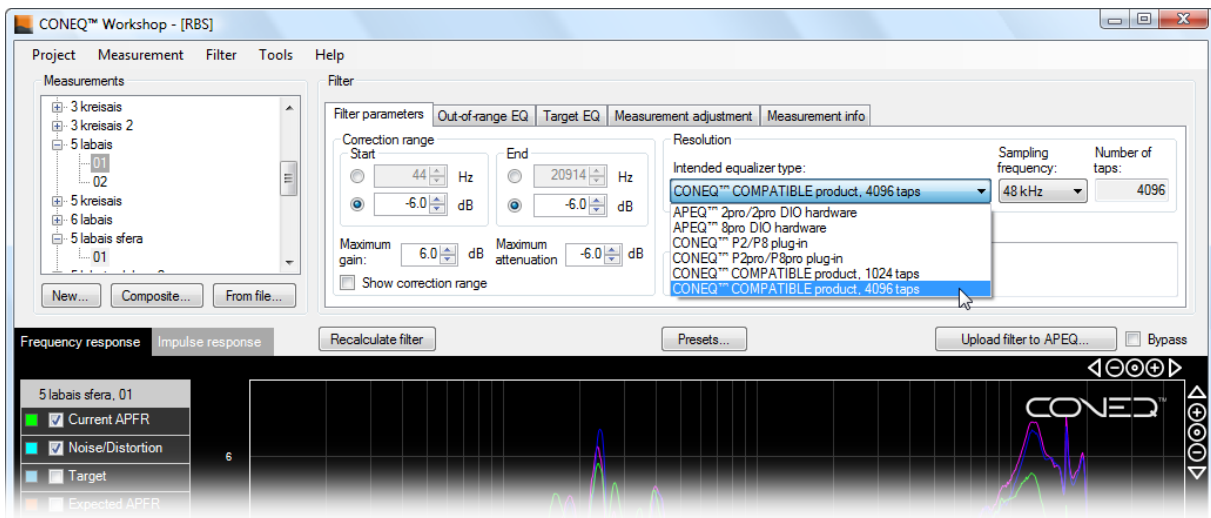


Figure 1: Two options for creating a CONEQ™ COMPATIBLE filter in CONEQ™ Workshop

**IMPORTANT!** Streams of different sampling frequencies require different filters. This means that to work on audio at 44.1kHz, 48kHz, and 96kHz, three separate CONEQ™ COMPATIBLE filters must be created for each channel. The exported CONEQ™ COMPATIBLE filter files contain no information about the intended sample rate. Thus, the third party product has no way of warning if a filter with wrong sample rate is being loaded. Loading filters of mismatched sample rate will lead to wrong equalization.

To export the CONEQ™ equalization filter as a CONEQ™ COMPATIBLE filter file, choose **Filter⇒Export coefficients...** from the menu (see figure 2). A file selection dialogue will open. Choose the location and name of the exported CONEQ™ COMPATIBLE filter file.

**IMPORTANT!** The exported filter file will have the extension .CSV and it will be the file that is imported by the CONEQ™ COMPATIBLE third-party product in order to use the corresponding CONEQ™ filter.

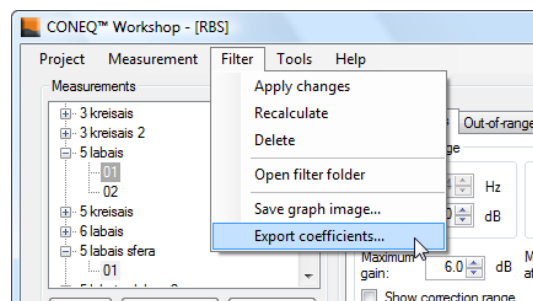


Figure 2: To export CONEQ™ COMPATIBLE filter coefficients, choose **Filter⇒Export coefficients...** from the menu

Exporting a CONEQ™ COMPATIBLE filter file requires a separate software license. Each time a filter is exported, a dialogue will be shown, telling how long the license is still valid.



To acquire a new license for CONEQ™ COMPATIBLE filter export after the current one expires, please contact your Real Sound Lab dealer.

## USING CONEQ™ FILTERS IN COMPATIBLE PRODUCTS

Once exported as filter coefficients, the CONEQ™ equalization filters can be imported into various third party products. The next sections describe steps needed to apply the CONEQ™ COMPATIBLE filter in the currently supported CONEQ™ COMPATIBLE products.

### BSS Audio Soundweb London

#### Device list

The table 1 shows the list of all BSS Audio Soundweb London products that had been tested to be CONEQ™ COMPATIBLE. The table also shows how many CONEQ™ filters each device can apply and how much processing power of the device it requires.

Table 1: CONEQ™ COMPATIBLE BSS Audio Soundweb London products

| Device model | 4096 tap filters |     | 1024 tap filters |     |
|--------------|------------------|-----|------------------|-----|
|              | Count            | CPU | Count            | CPU |
| BLU-800      | 4                | 61% | 24               | 91% |
| BLU-160      | 4                | 61% | 24               | 91% |
| BLU-80       | 0                | -   | 4                | 77% |
| BLU-16       | 0                | -   | 4                | 67% |
| BLU-100      | 2                | 61% | 12               | 91% |
| BLU-101      | 2                | 61% | 12               | 91% |
| BLU-102      | 2                | 61% | 12               | 91% |

#### Applying CONEQ™ filters

Putting CONEQ™ filters on the BSS Audio Soundweb London devices is done by using HiQnet London Architect software (v3.08 or later). The software allows dynamic configuration of signal processing components. One of such components is an FIR (finite impulse response) filter that can be found under **Processing Objects**⇒**Primitives**⇒**FIR Filter** (see figure 3). After adding the FIR filter object to the processing network, load the FIR coefficients by selecting the FIR filter object's properties and importing the coefficient CSV file that was exported from CONEQ™ Workshop as described on page 3. The figure 4 shows the relevant controls.

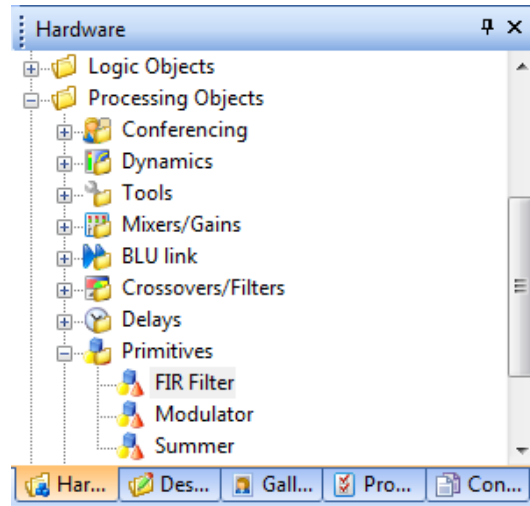


Figure 3: The FIR Filter object in HiQnet London Architect.

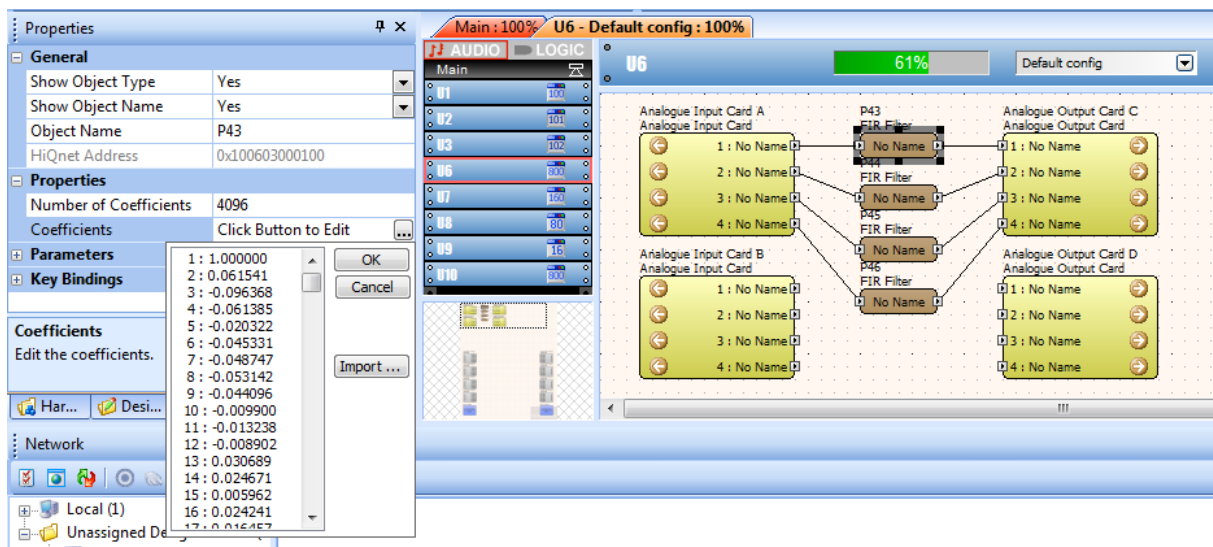


Figure 4: Loading FIR coefficients in HiQnet London Architect.

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