miniDSP SHD

DIRAC qobuz ASIO COMPATIBLE ASIO is a registered trademark of Steinberg Media Technologies GmbH

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VOLUMIO Spotify®

Product Overview

The **miniDSP SHD** (“Streaming High Definition”) is a powerful DSP-based network streamer and audio processor featuring Dirac Live®, the world’s premier room correction solution.

The miniDSP SHD is a certified Roon Ready network player. Being Roon Ready means that miniDSP uses Roon streaming technology, for an incredible user interface, simple setup, rock-solid daily reliability, and the highest levels of audio performance, without compromise. The SHD also runs Volumio, a popular open-source network streamer, providing web-based access to music files from sources as diverse as a USB stick to Internet Radio and Spotify.

The SHD has extensive connectivity options. Three digital inputs, two analog inputs and USB Audio enable the SHD to fit right into any modern audio system. The four-channel DSP-controlled outputs are available as single-ended (RCA) and balanced (XLR) analog as well as SPDIF digital.

In addition to Dirac Live, the miniDSP SHD includes our powerful but user-friendly DSP audio tuning software – ten-band parametric EQ per channel, crossovers up to 48 dB/octave, compressor/limiter, and a flexible 2x4 matrix mixer – for audio system tuning in applications ranging from subwoofer integration to a two-way active speaker.

The SHD is configured using our comprehensive control program, miniDSP Device Console, which runs on Windows and macOS, and the Dirac Live calibration program from Dirac Research.

Note

DISCLAIMER/WARNING

miniDSP cannot be held responsible for any damage that may result from the improper use or incorrect configuration of this product. Please read this manual carefully to ensure that you fully understand how to operate and use this product, as incorrect use or use beyond the parameters and ways recommended in this manual have the potential to cause damage to your audio system.

Please also note that many of the questions we receive at the technical support department are already answered in this User Manual and in the online application notes on the miniDSP.com website. So please take the time to carefully read this user manual and the online technical documentation. And if an issue arises with your unit, please read through the Troubleshooting section first. Thank you for your understanding!

WARRANTY TERMS

miniDSP Ltd warrants this product to be free from defects in materials and workmanship for a period of one year from the invoice date. Our warranty does not cover failure of the product due to incorrect connection or installation, improper or undocumented use, unauthorized servicing, modification or alteration of the unit in any way, or any usage outside of that recommended in this manual. If in doubt, contact miniDSP prior to use.

The SHD Series

The **miniDSP SHD** is one of a series of related products – the *SHD Series*. Each has the same processing capabilities, but different input-output capabilities. The other members of the series are:

- **SHD Studio**. A compact all-digital input-output model, perfect for use in modern all-digital systems, studios, and professional applications. See the product page (https://www.minidsp.com/products/streaming-hd-series/shd-studio) for more information.
- **SHD Power**. A compact integrated DSP preamp and power amplifier. 120W per channel of clean power on tap and two subwoofer outputs. See the product page (https://www.minidsp.com/products/streaming-hd-series/shd-power) for more information.

Typical applications

The miniDSP SHD processor replaces multiple components in a conventional audio system -- preamplifier, network streamer, DAC and room correction are all bundled into a single affordable unit. Figure 1 illustrates how a miniDSP SHD can simplify your audio system, using it as a digital preamp with network streaming, subwoofer integration and stereo (two-channel) Dirac Live room correction.

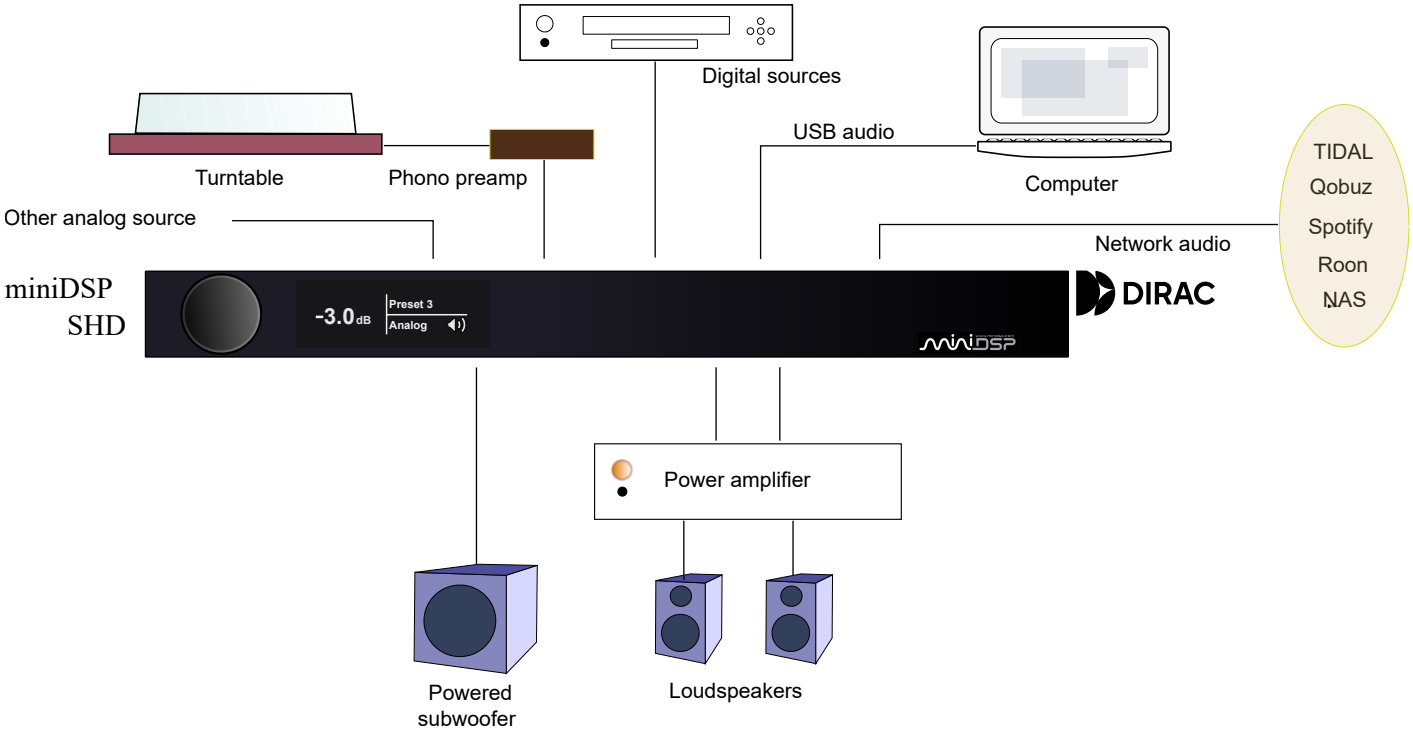
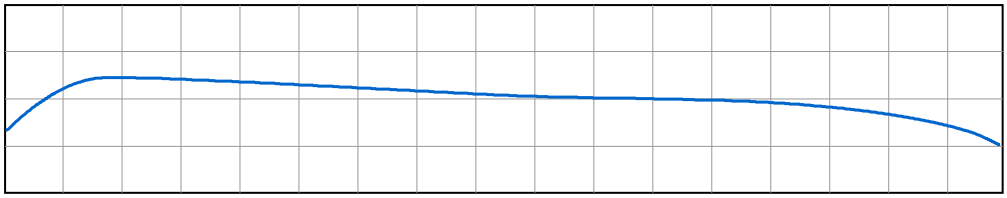


Figure 1. miniDSP SHD as preamp with network streaming, subwoofer integration and stereo (two-channel) Dirac Live room correction

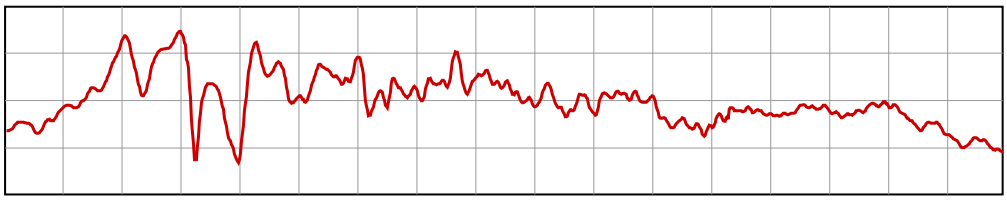
Dirac Live room correction

The miniDSP SHD executes stereo (two-channel) Dirac Live® digital room correction, from Dirac Research (https://www.dirac.com/) . Dirac Live's mixed-phase filtering technology will improve the imaging of your system, minimize the effects of room modes and resonances, and improve dynamics and clarity.

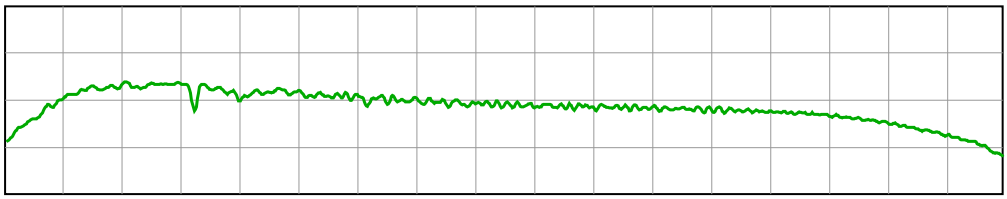
To accomplish this, the **Dirac Live** software steps you through the procedure for taking measurements around your listening area. It employs a sophisticated analysis algorithm to make the optimal correction across the *whole* listening area, not just at a single point. You have full control over the target frequency response. Measurements are taken with the miniDSP UMIK-1 or UMIK-2 calibrated acoustic measurement microphone.



Target magnitude response

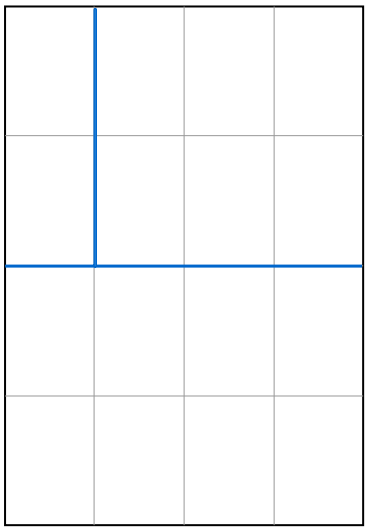


Uncorrected magnitude response



Corrected magnitude response

In addition to correcting magnitude response, Dirac Live® corrects the system's *impulse response*, which reflects how the system responds to a sharp transient such as a drumbeat. Reflections, diffraction, resonances, misaligned drivers, and so on, all combine to smear out the transient. Impulse response correction is a critical factor for accurate sound-staging, clarity and bass reproduction.



Ideal
impulse response

Uncorrected
impulse response

Corrected
impulse response

Specifications

The full specifications are available in the datasheet at the following link:

- miniDSP SHD datasheet (https://www.minidsp.com/images/documents/Product%20Brief-SHD.pdf)

Software Installation

The miniDSP SHD is configured with software running on a PC or Mac.

System requirements

Windows

- Windows 10 or later, with all updates installed
- At least a dual core Intel i5 processor or better, or AMD equivalent (ARM processors are not supported)
- At least 8 GB RAM
- Two free USB 2.0 ports
- Internet connection

> **Info**
>
> Note that Windows running on ARM processors is not supported.

macOS

- macOS:
  - For Dirac Live: macOS 11 Big Sur or later, latest version with all updates
  - For miniDSP Device Console: macOS 10.12 Sierra or later
- At least a dual core Intel i5 processor or better, or an Apple ARM (M-series) processor
- At least 8 GB RAM
- Two free USB 2.0 ports
- Internet connection

> **Info**
>
> Intel and Apple ARM processors are supported with separate binaries for miniDSP Device Console.

Download the miniDSP software

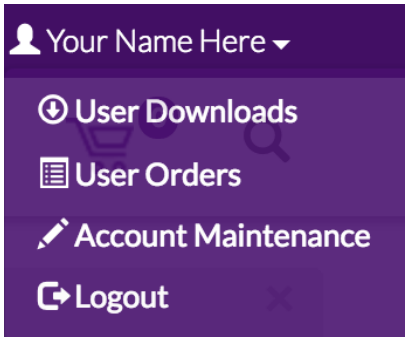
If you purchased your SHD directly from miniDSP, your software will be available from the User Downloads (https://www.minidsp.com/userdownloads) section of the miniDSP website when your order ships. To access the download, you will need to be logged into the website with the account you created when purchasing.

If you purchased your SHD from a miniDSP dealer, you will receive a coupon together with the product. To redeem this coupon, go to this page:

- Redeem your miniDSP software (https://www.minidsp.com/support/redeem-coupon)

Select the Plugin Group **SHD Series (SHD/SHD Studio/SHD Power)** from the dropdown menu and enter your coupon's code. Click the **Validate** button.

The User Downloads link is visible from the drop-down menu at the top right of the website:



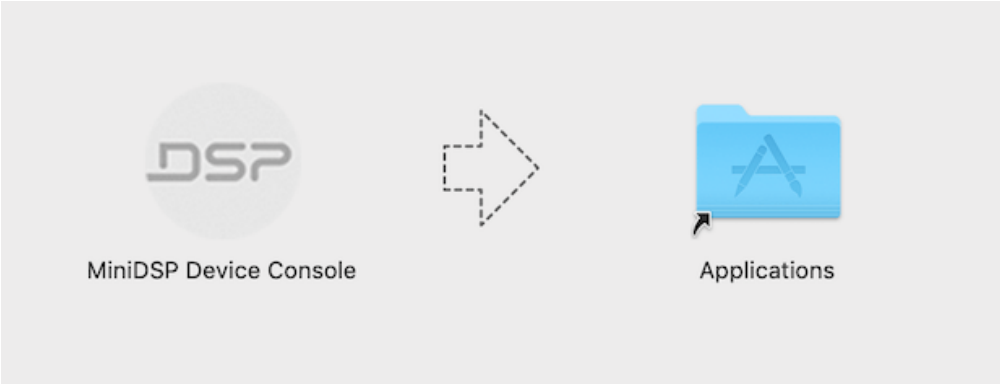
Navigate to the **SHD Series** section.

Underneath the heading **miniDSP Device Console**, select the download according to your platform: Windows 10/11, macOS with M-series ARM CPU, or macOS with Intel CPU.

Install the miniDSP software

Install on macOS

1. Double-click on the downloaded **miniDSP Device Console-x.y.z.dmg** (Intel version) or **miniDSP Device Console-x.y.z-arm64.dmg** (ARM version) image file to open it. (The version number *x.y.z* embedded in the file name will change over time.)
2. Drag the miniDSP Device Console application icon to your Applications folder.



3. To run Device Console, locate it in the Applications folder and double-click on it. To make it easier to run in future, right-click on its dock icon and select Options -> Keep in Dock.

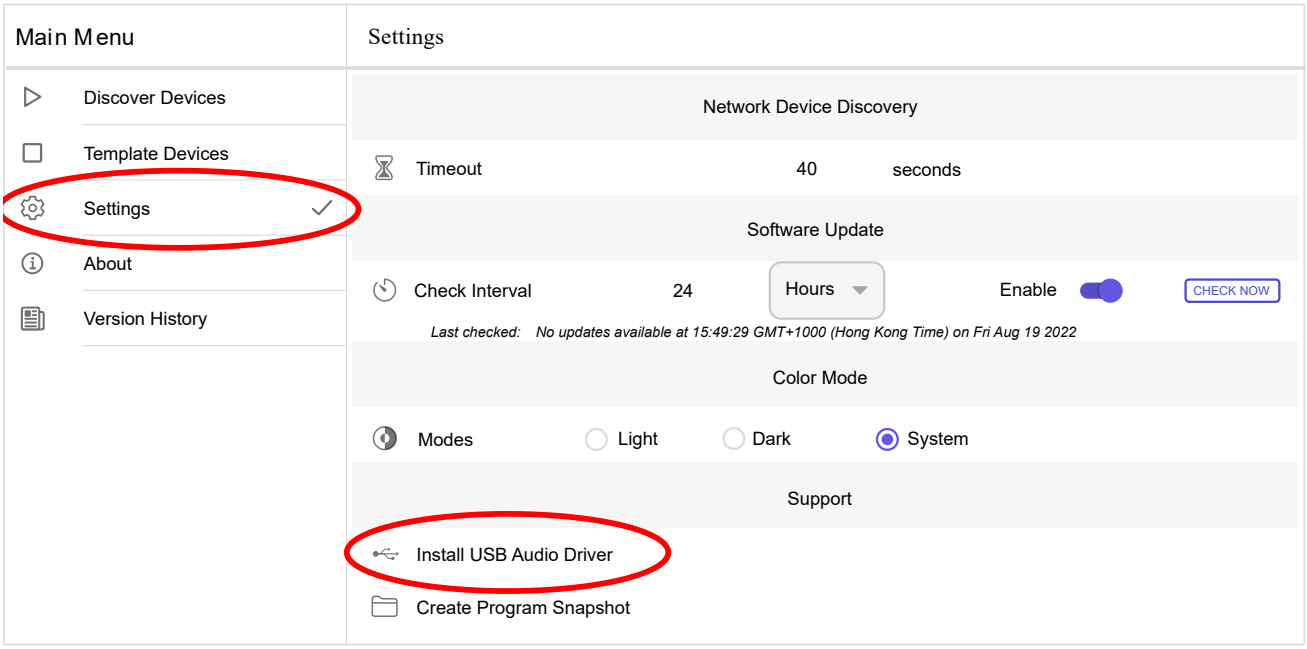
The first time you run Device Console on macOS Sequoia or later, you will see the following security warning:

Click on **Allow**. If you do not get this warning, or you click **Don't Allow** by mistake, you can change this in the System Settings. See Network access errors on the Troubleshooting page.

> **Info**
>
> The macOS version of miniDSP Device Console is installed for all users on the computer.

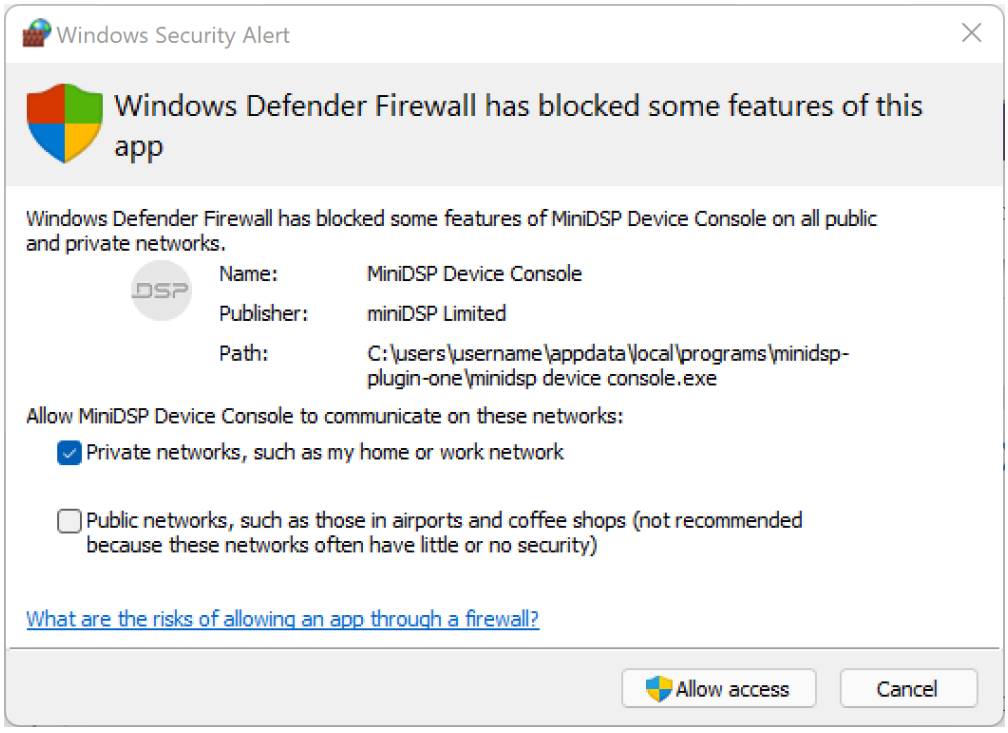
Install on Windows

1. Double-click on the downloaded **MiniDSP Device Console Setup x.y.z.exe** installer to run it. (The version number *x.y.z* embedded in the file name will change over time.)
2. Install the miniDSP UAC2 USB Audio driver:
   a. Start miniDSP Device Console.
   b. Navigate to the Settings screen and select **Install USB Audio Driver**:



Device Console will confirm that you want to install the driver. Click on the **PROCEED** button. Note: we recommend that you accept the default installation location.

The first time you run Device Console and the Dirac Live application, you may see a Windows Firewall warning such as the one below. Ensure that "Private networks..." is checked and "Public networks..." is not checked. Then click on "Allow access." This warning dialog may appear more than once.



> **Info**
>
> The most recent miniDSP processors require the UAC2 driver to be at least version 5.40. If you have difficulty with the UAC2 driver or control panel, use **Install USB Audio Driver** to install the latest version.

> **Info**
>
> The Windows installation of miniDSP Device Console is for a single user. If it needs to be run in more than one account on your PC, it will need to be installed for each account.

Download and install Dirac Live

Download the **Dirac Live** application for your platform from the Dirac Research download page (https://www.dirac.com/resources/downloads) . On macOS, double-click on the diraclive-latest.zip download if your browser did not unzip it.

Double-click on the downloaded installer to run it. It will be named **diraclive-latest.exe** on Windows and **DiracLive v3.x.y Setup Darwin** on macOS (the version number *x.y* will change as updates are issued). We strongly recommend that you accept the default installation settings.

Do not run the application from the installer, as it must be started with the **Start Calibration** button in Device Console.

Basic Operation

Front and rear panels

The miniDSP SHD is a sophisticated device with a range of audio applications. This section of the manual explains operation of the SHD in its default configuration. Once you are familiar with its basic usage, read the following sections of this manual to learn how to set up more advanced configurations with miniDSP Device Console.

Once your configuration is complete, you can run Dirac Live to optimize the whole system for your room.

Front panel

The front panel and rotary encoder provide access to the key features of the miniDSP SHD. These can also be accessed with a remote control.

Volume

To change the volume, rotate the encoder. The volume changes in 0.5 dB steps. Minimum volume is -127.5 dB and maximum volume is 0.0 dB.

Preset

To select one of the four presets, press the encoder knob once, then rotate until the desired preset number is displayed. Either press the encoder knob again or wait for a second. The display will show "Pls wait..." while the new preset is being loaded, and then return to normal.

Audio source

To select an audio source, press the encoder knob twice, then rotate the encoder until the desired input source is displayed. Either press the encoder knob or wait for a second and the display will return to normal with the new input selected.

Dirac Live enable/disable

To turn Dirac Live filtering on and off, press the encoder knob three times, then rotate the encoder knob until the desired selection (on or off) is displayed. Either press the encoder knob or wait for a second and the display will return to normal with the Dirac Live status:

Dirac Live on

Dirac Live off

Mute

To mute output, press and hold the encoder knob. When the display changes to show "Mute?," release the knob. To unmute, repeat this procedure.

Not muted

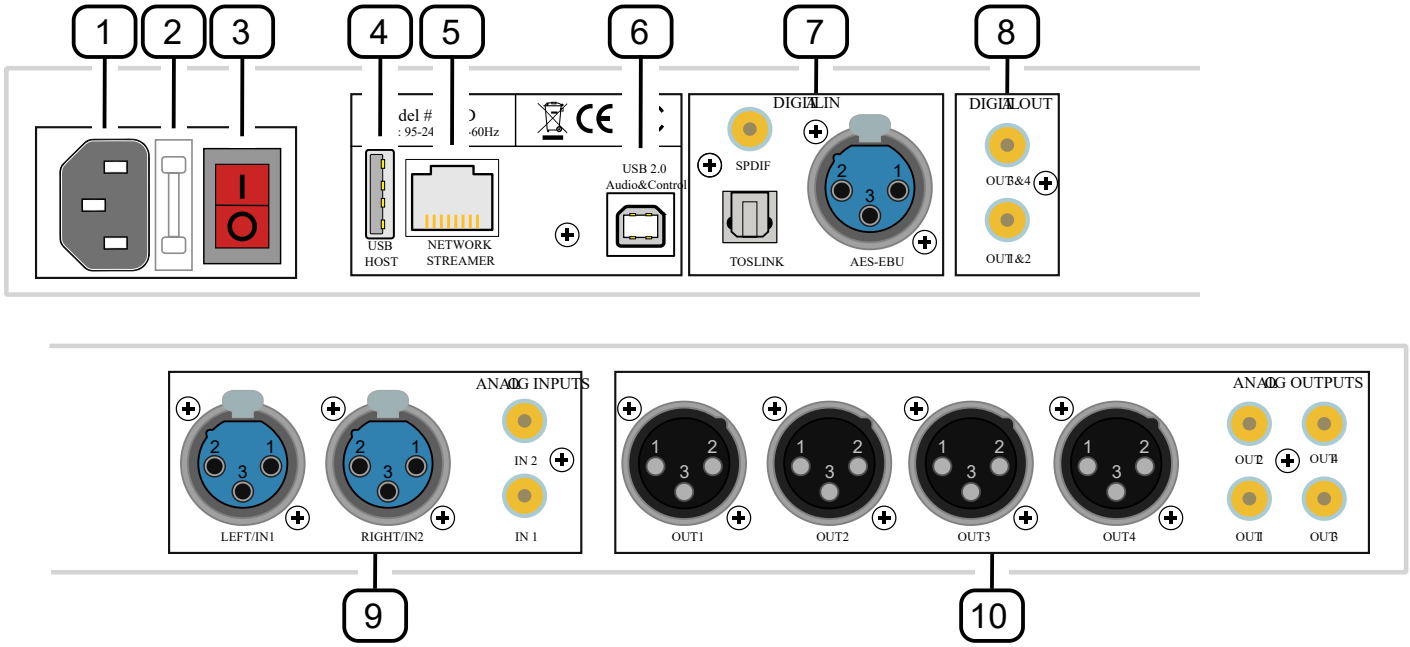
Muted

Standby

To put the SHD into standby, press and hold the encoder knob. When the display changes to show "Standby?," release the knob. To take it out of standby, press the encoder knob.

Rear panel

> **Warning**
>
> Ensure all equipment is powered off when making audio connections.



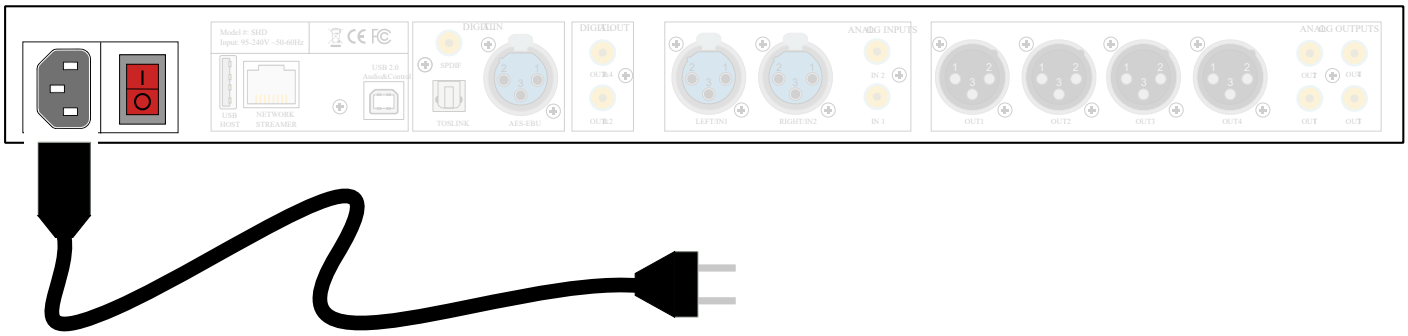
1. **Power inlet**. Connect a standard IEC C13 cable here. The mains supply voltage can be in the range 95 to 240 VAC, 50 to 60 Hz.
2. **Fuse holder**. If the fuse needs replacing, remove the power cable. Then use a small flat-bladed screwdriver to lever out the fuse and fuse holder. Replace the fuse with a 250V rated 4A fuse and push the fuse holder firmly back in.
3. **Power switch**. Turns power to the SHD on and off.
4. **Host port** for USB music stick or Wi-Fi adapter.
5. **Ethernet port** for network music streaming.
6. **USB port** for control and audio streaming. Connect to an available USB port on your computer.
7. **Digital inputs**. Connect digital sources here using optical (TOSLINK SPDIF), coax (RCA SPDIF), or AES/EBU (XLR). Sample rates from 32 up to 216 kHz are supported. The three digital inputs can be individually selected with the front panel encoder or the remote control.
8. **Digital outputs**. Connect external DACs or other digital equipment using RCA SPDIF. These outputs each carry a stereo signal. The data format is 24-bit 96 kHz. Connected equipment must therefore be able to accept a 24-bit 96 kHz input signal. Note: if using two different DACs, you may need to adjust the time delay on the output channels accordingly.
9. **Analog inputs**. Connect one or two analog sources here, using balanced XLR or unbalanced RCA connections. The two analog inputs can be individually selected with the front panel encoder or the remote control. See Specifications for maximum input voltages.
10. **Analog outputs**. Connect power amplifiers here using balanced XLR or unbalanced RCA connections. The maximum output is 4 Vrms on the balanced XLR outputs and 2 Vrms on the unbalanced RCA connectors.

Power and control

This page describes how to connect the miniDSP SHD to power, and the connections needed to configure it using Device Console and Dirac Live.

Power

Fit the supplied IEC cable to the rear panel and plug the AC mains plug into the power outlet.

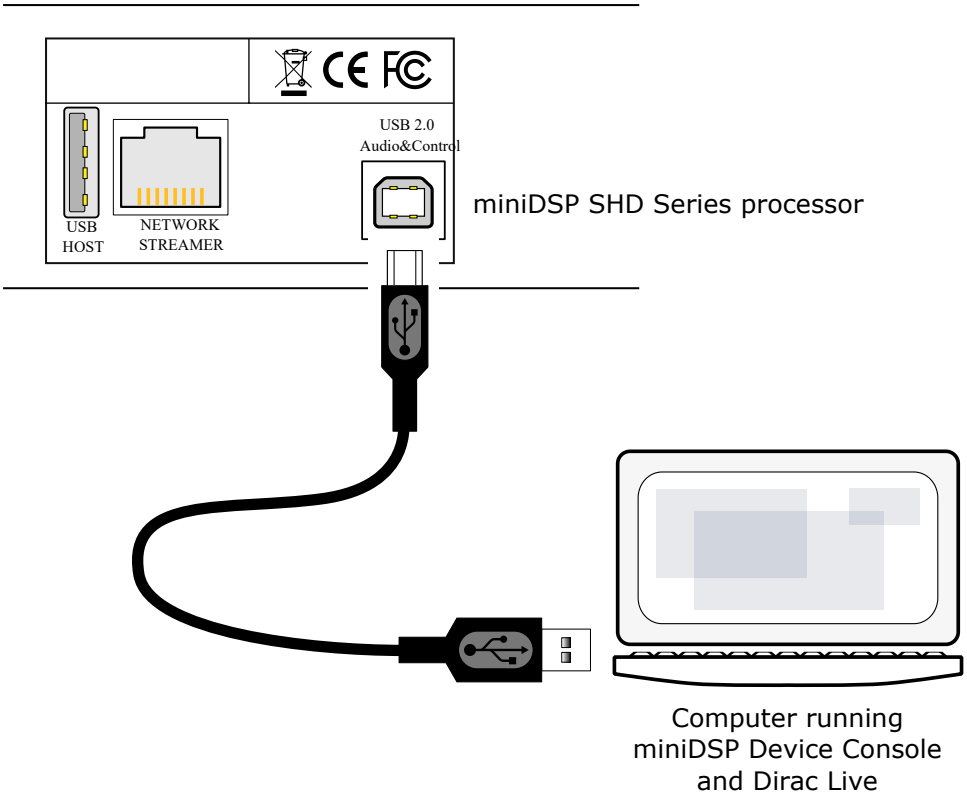


Turn on power with the rear panel switch only after all input and output connections have been made. When not in use, the SHD can be placed into standby mode with the remote control or front panel. When being powered on and off with the rear panel switch, the following turn-on/turn-off sequence is recommended:

- **On**: Power on line-level equipment, including the SHD, then turn on power amplification.
- **Off**: Turn power amplification off, then power off line-level equipment, including the SHD.

Configuration over USB

The USB port is used to configure the SHD with Device Console and Dirac Live. Usually, this is connected directly: use the supplied cable to connect a free USB 2.0 port of your computer to the USB port (Type-B) on the SHD rear panel.

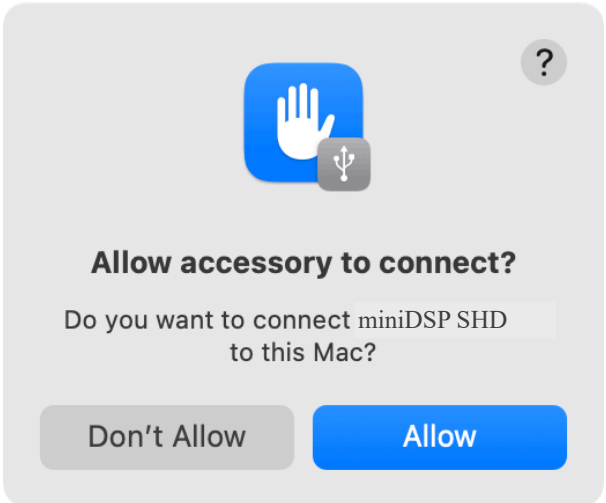


If longer cable lengths are required, an active USB extension cable can be used.

> **Info**
>
> Note that the SHD can **not** be configured using the Ethernet connection – the Ethernet connection (and the USB Wi-Fi dongle) are for audio streaming **only**.

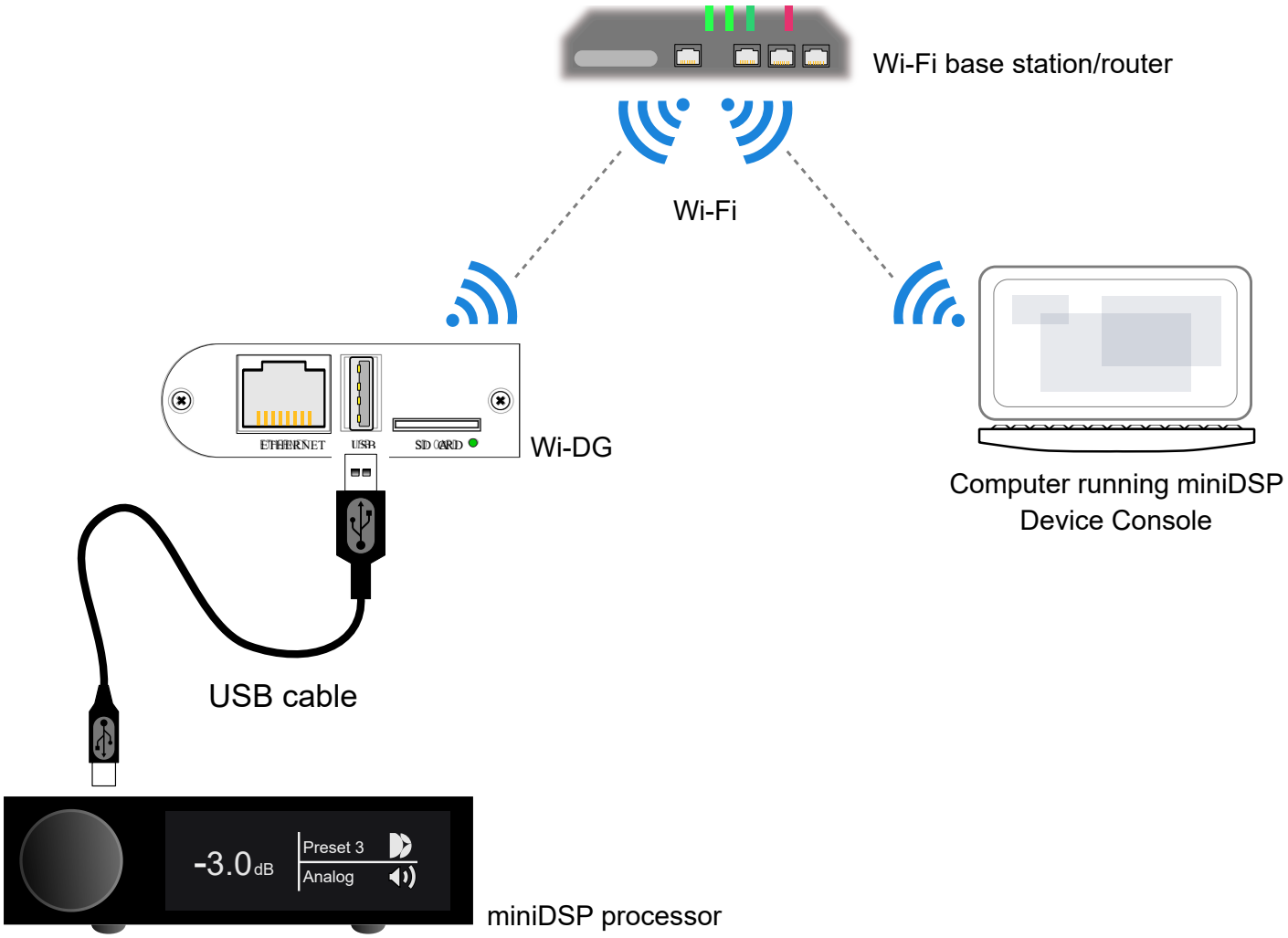
Note for macOS users

The first time the SHD is connected to the computer over USB, you will need to approve the connection. A dialog such as the following will appear. **Click on "Allow".**



Configuration over the network (Device Console only)

For configuration using Device Console, an optional miniDSP Wi-DG (https://www.minidsp.com/products/accessories/wi-dg) Wi-Fi to USB bridge can be used. This enables configuration over the Wi-Fi network, without the USB cable. The figure below shows a typical connection example.



Info

Configuration via a Wi-DG works with Device Console *only*. It does not work with Dirac Live. For Dirac Live, a wired USB connection is **required**.

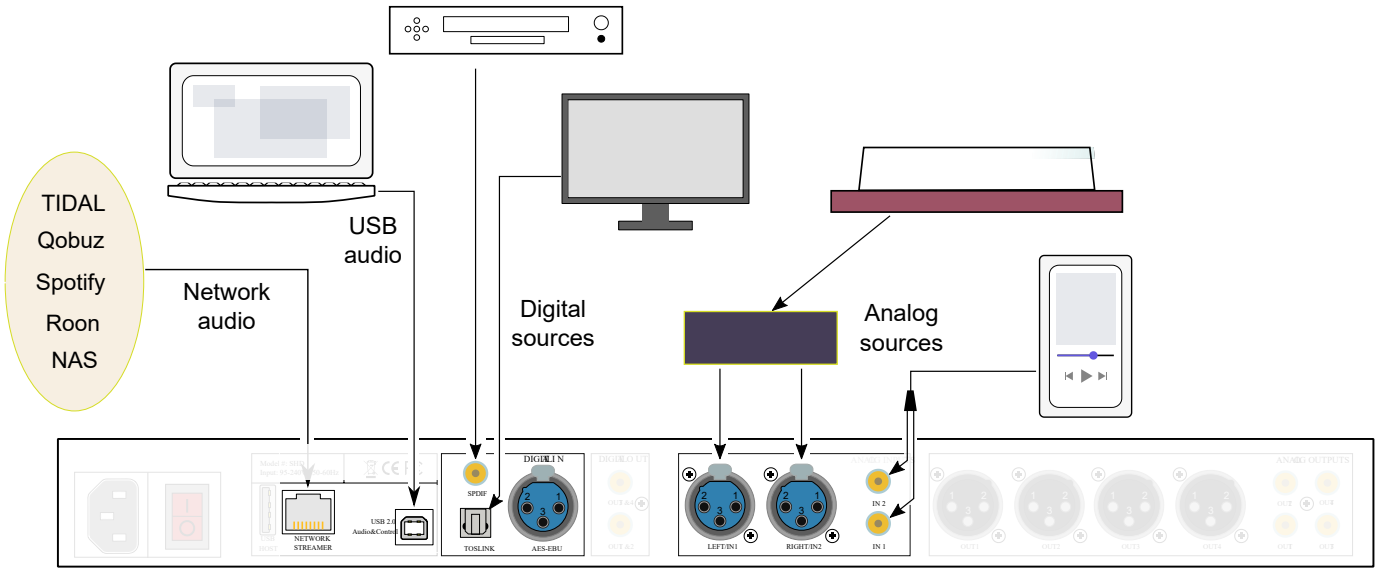
Playing Audio

The miniDSP SHD has a range of input sources and output connections. This page provides an overview so you can quickly get started with playing audio.

> **Warning**
>
> Ensure all equipment is powered off when making audio connections.

Connecting sources

The diagram below illustrates the audio sources that can be connected to the miniDSP SHD.

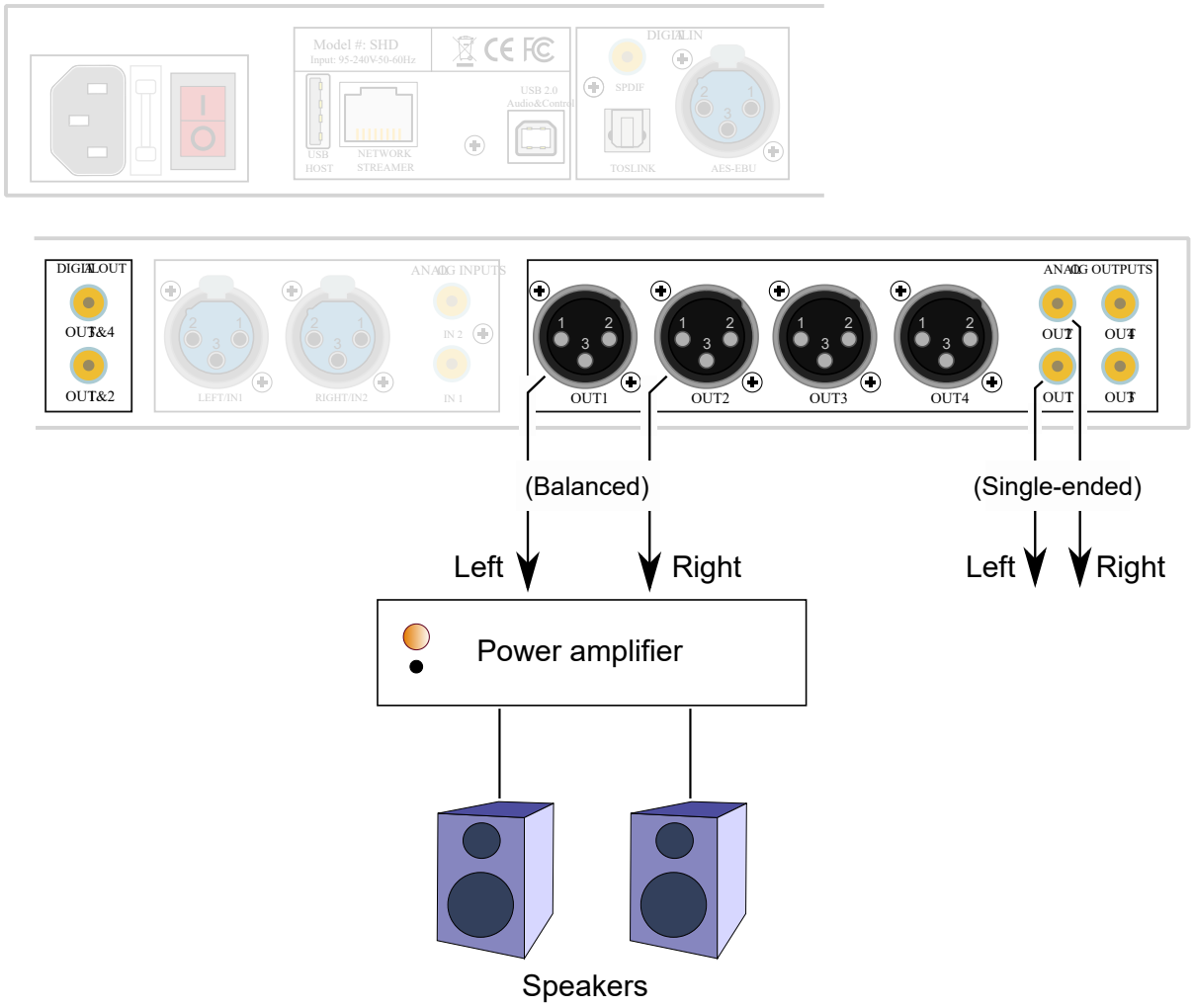


Connecting audio sources to the miniDSP SHD (click for larger)

Note that the two pairs of analog inputs – RCA and XLR – are independent, and can both be connected at the same time. Select one of them from the front panel or with a remote control.

Connecting an amplifier and speakers

The diagram below illustrates connection of a power amplifier and a pair of speakers to the SHD. The default settings of the SHD route input channels 1 and 2 to output channels 1 and 2 with no crossovers active, so no further configuration is needed for this simple usage of the SHD.



Connecting a stereo amplifier and speakers to the miniDSP SHD

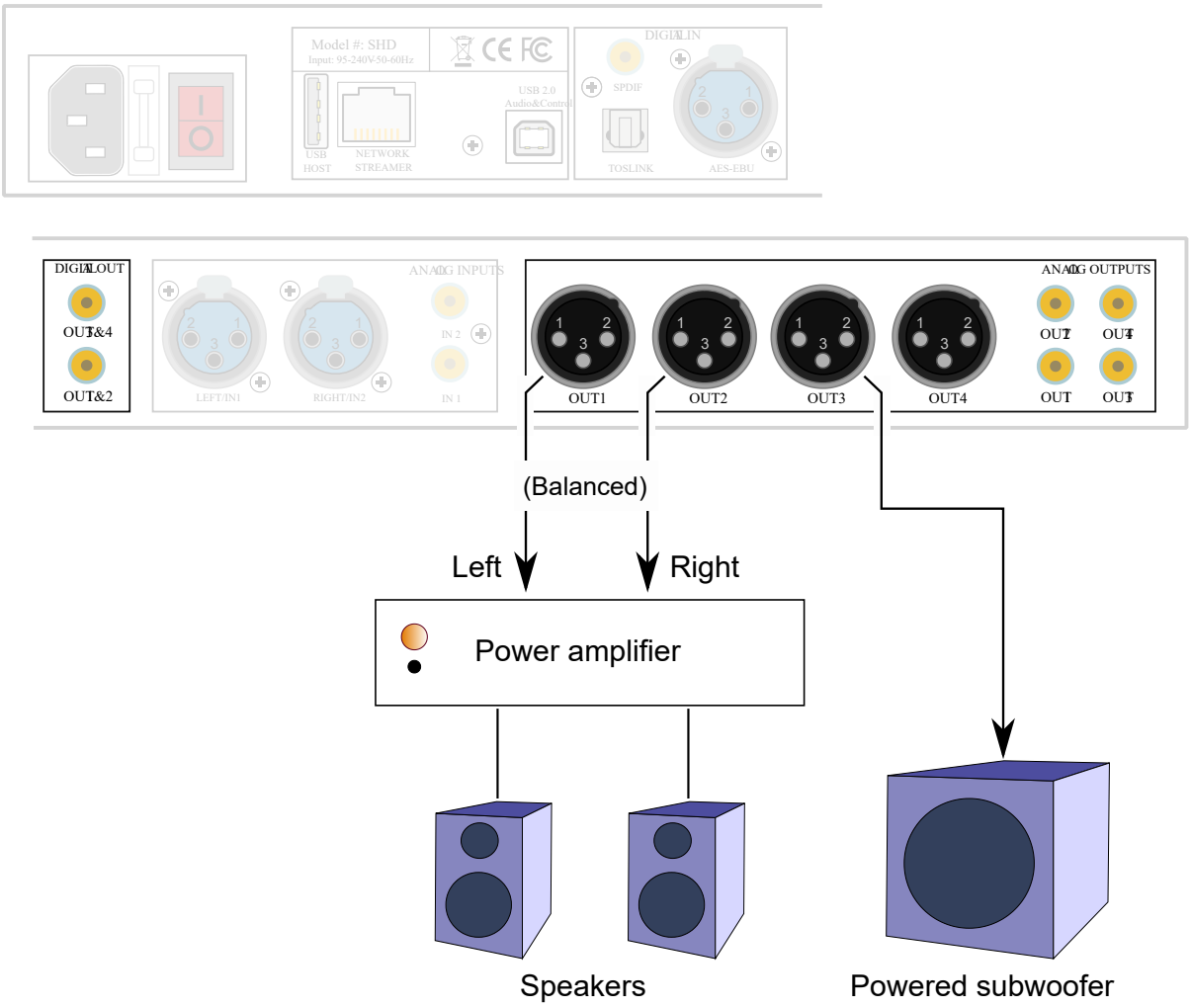
The amplifier can be connected to either set of analog outputs – RCA and XLR – according to the type of input connectors that it has. Each set has the same audio signal, but the signal level on the XLR (balanced) outputs is double that of the RCA outputs (unbalanced).

If needed, both XLR and analog outputs can be connected, which can be useful in specific cases (such as connecting a subwoofer in parallel with the woofers in a two-way speaker).

> **Warning**
>
> Before playing audio for the first time, turn the volume down using the front panel encoder. Increase it gradually after audio playback starts.

Advanced configuration

The miniDSP SHD is a flexible and powerful device that allows many more system configurations than simple stereo playback. For example, a powered subwoofer can be connected as shown here:



Connecting a stereo amplifier, speakers and subwoofer to the miniDSP SHD

Additional configurations, such as dual subwoofers and two-way active speakers, are easily achievable with the SHD.

To use the SHD in these more advanced configurations, you will need to use miniDSP Device Console to set up its audio processing. We recommend that you take the time to read through the remaining sections of this manual and familiarize yourself with its capabilities.

In particular, see the Routing examples section to find an example that is close to your desired application and for links to tutorial-style application notes.

About USB Audio

This content has moved to USB audio.

USB Audio

About USB Audio

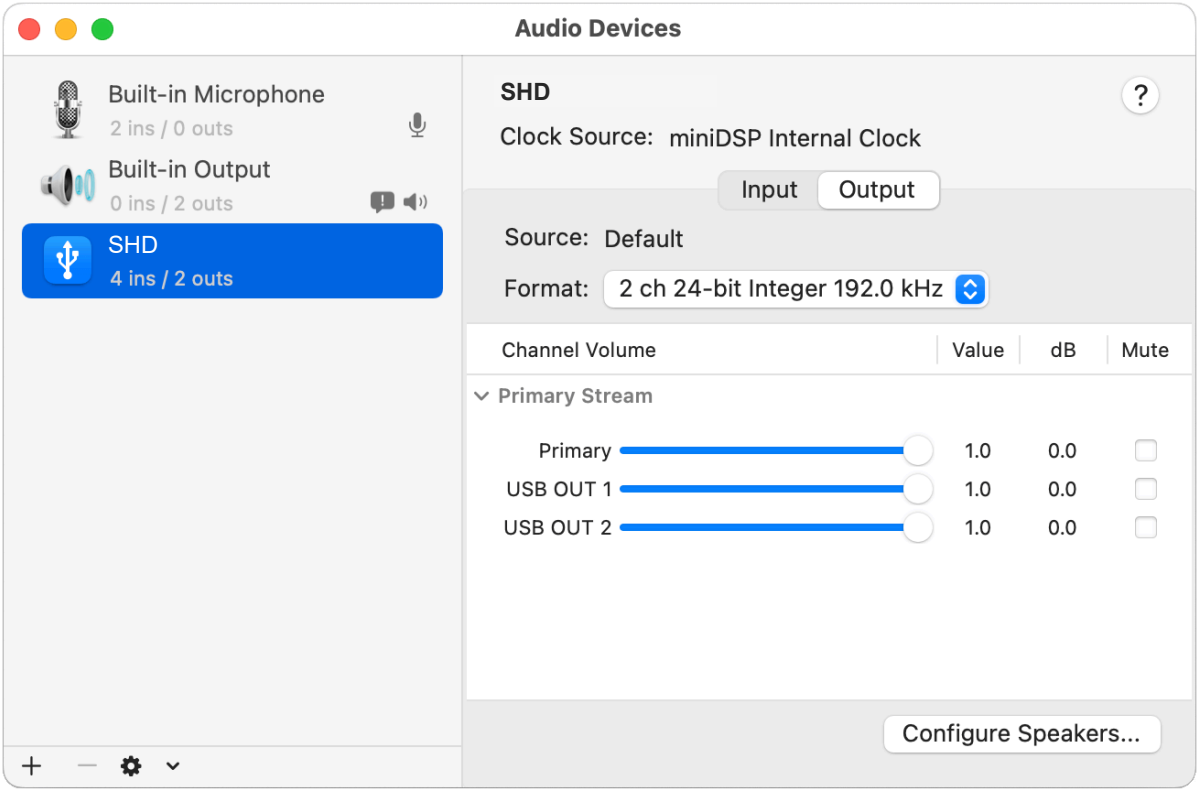
The miniDSP SHD accepts stereo PCM audio over USB at sample rates up to 192 kHz. The same USB connector is used for playing USB Audio as well as for configuration and Dirac Live calibration.

To play USB Audio from a computer, use the supplied cable to connect the USB 2.0 (Type B) port of the SHD to a free USB port on your computer.

The miniDSP SHD also appears to the computer as a USB *input*. That is, the four processed outputs can be recorded or analyzed by the computer. Note that the signal processing flow is different to "pro audio" interfaces.

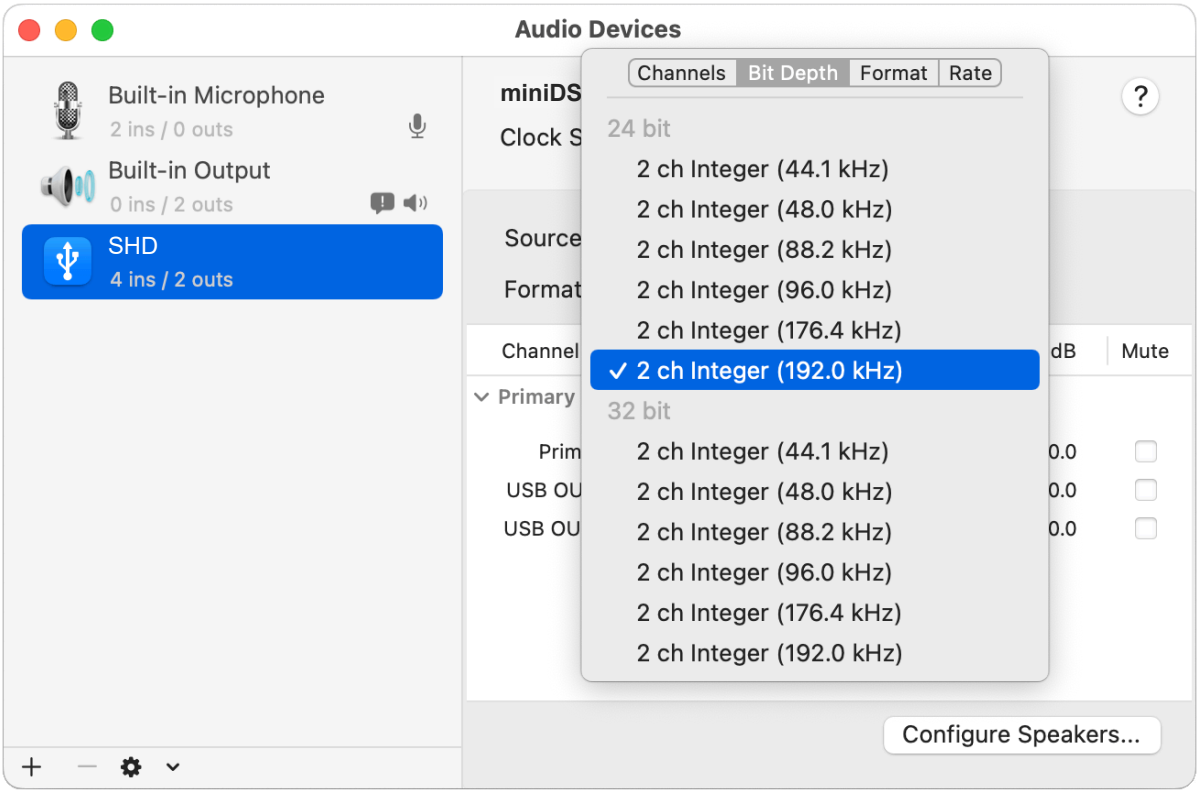
macOS

The miniDSP SHD is USB Audio compliant, so no drivers need to be installed to play audio on macOS. Open **Audio MIDI Setup** (in **Applications**->**Utilities**) and click on its name in the list on the left-hand side.



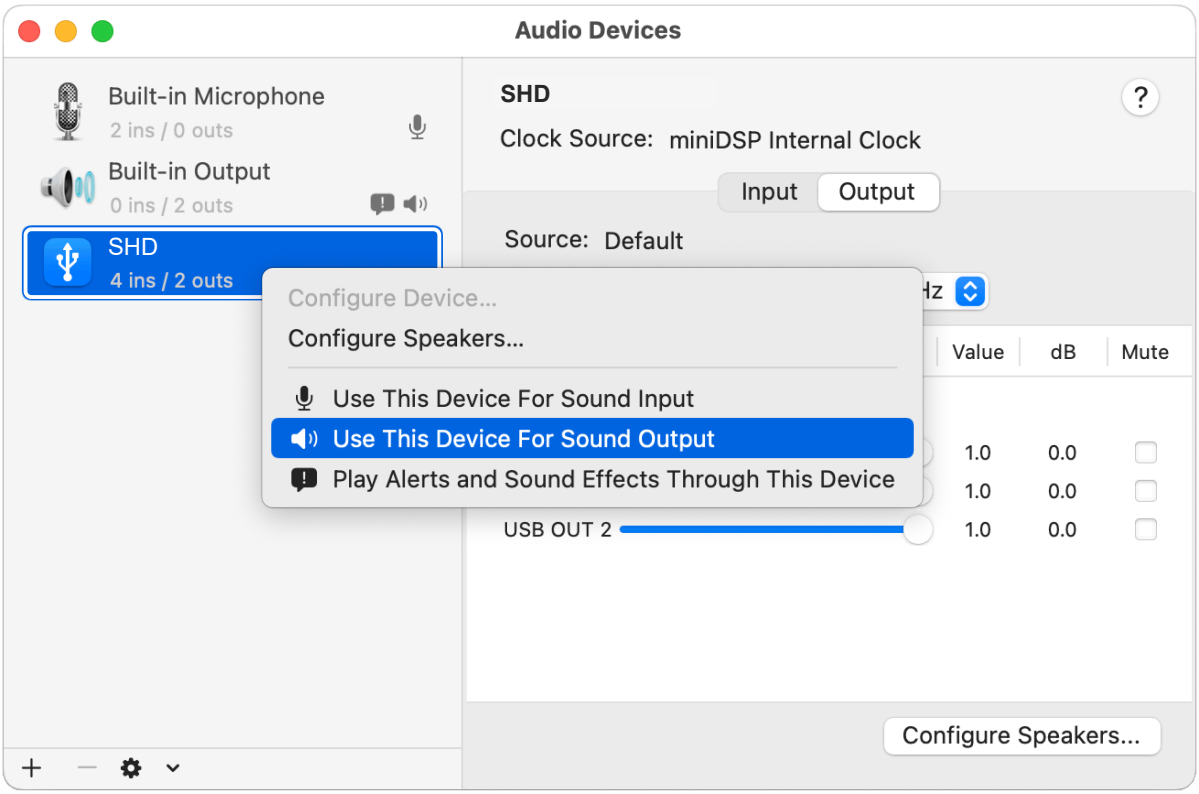
Set sample rate

Click on the selector next to **Format** to bring up the sample rate and bit depth selector. Sample rates up to 192 kHz can be selected:



Default audio device

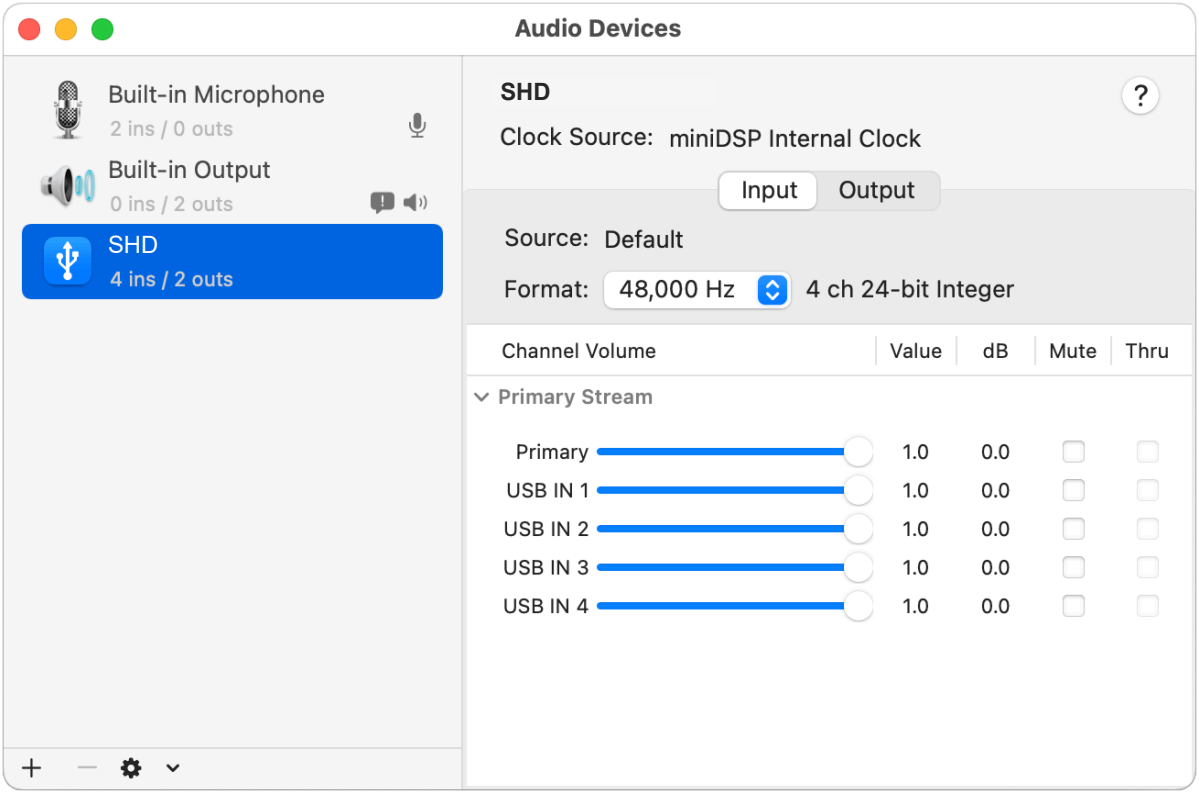
To set the SHD as the default audio output device, right-click and select "Use this device for sound output":



Note that individual audio playback apps may allow the SHD to be selected for audio output independently of the system default. They may also control sample rate automatically.

USB Audio from SHD to computer

The miniDSP SHD sends its four output channels *to* the computer over USB. Click on the **Input** button in Audio MIDI Setup to see them. These can be used to monitor or record the output channels of the SHD:



For an example application using this feature, see the app note Analog recording with miniDSP and ocenaudio (https://www.minidsp.com/applications/advanced-tools/analog-recording-with-minidsp-adc) on our website.

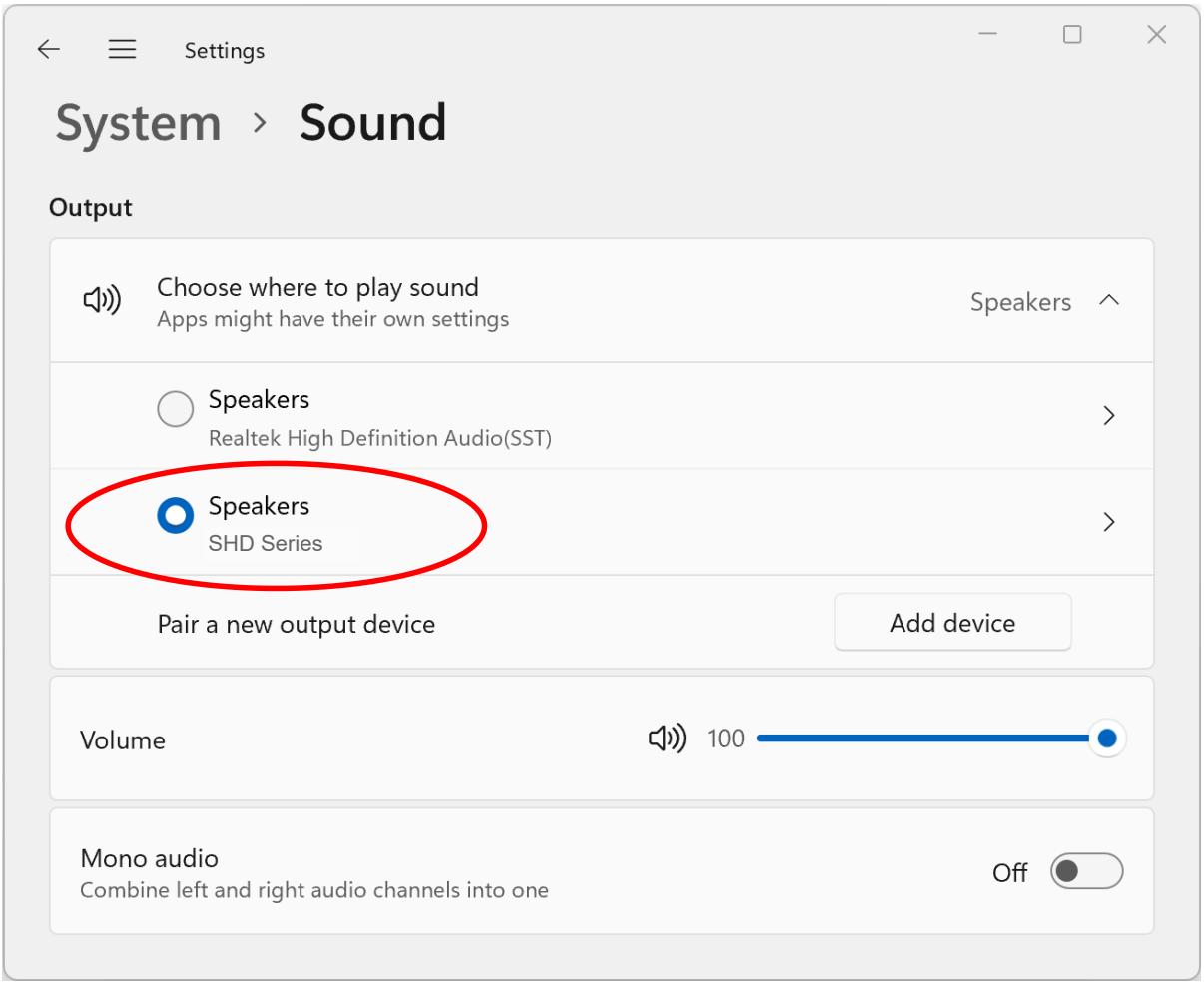
> **Tip**
>
> To avoid having macOS resample the outputs from the SHD, set the sample rate here to the DSP's internal sample rate: **96 kHz**.

Windows 11

Note: to play USB audio from Windows, the miniDSP UAC2 driver package must be installed first.

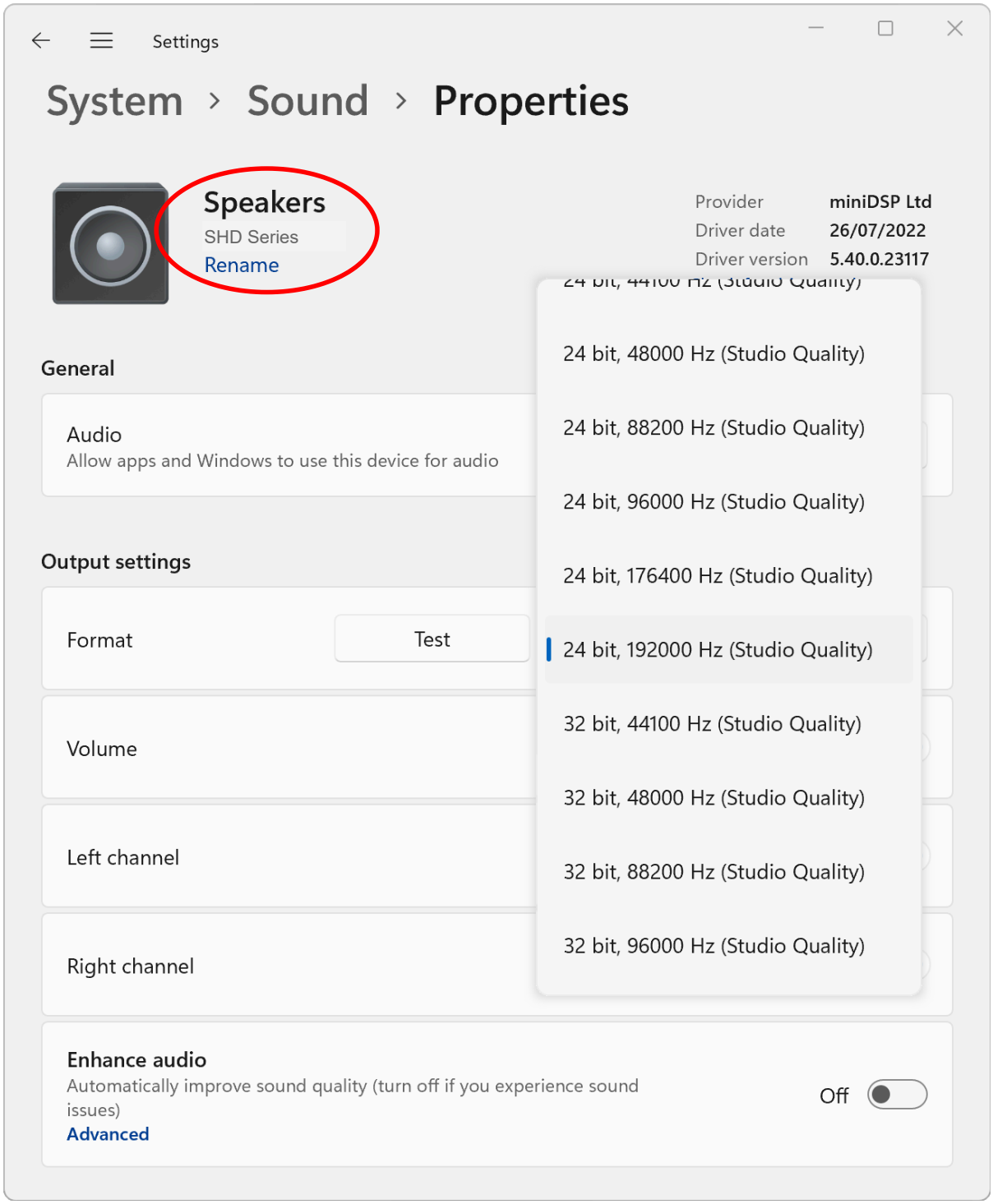
Default audio device

To set the miniDSP SHD as the default audio output device, open the Settings app and navigate to the System → Sound page. Select the SHD with the radio button:



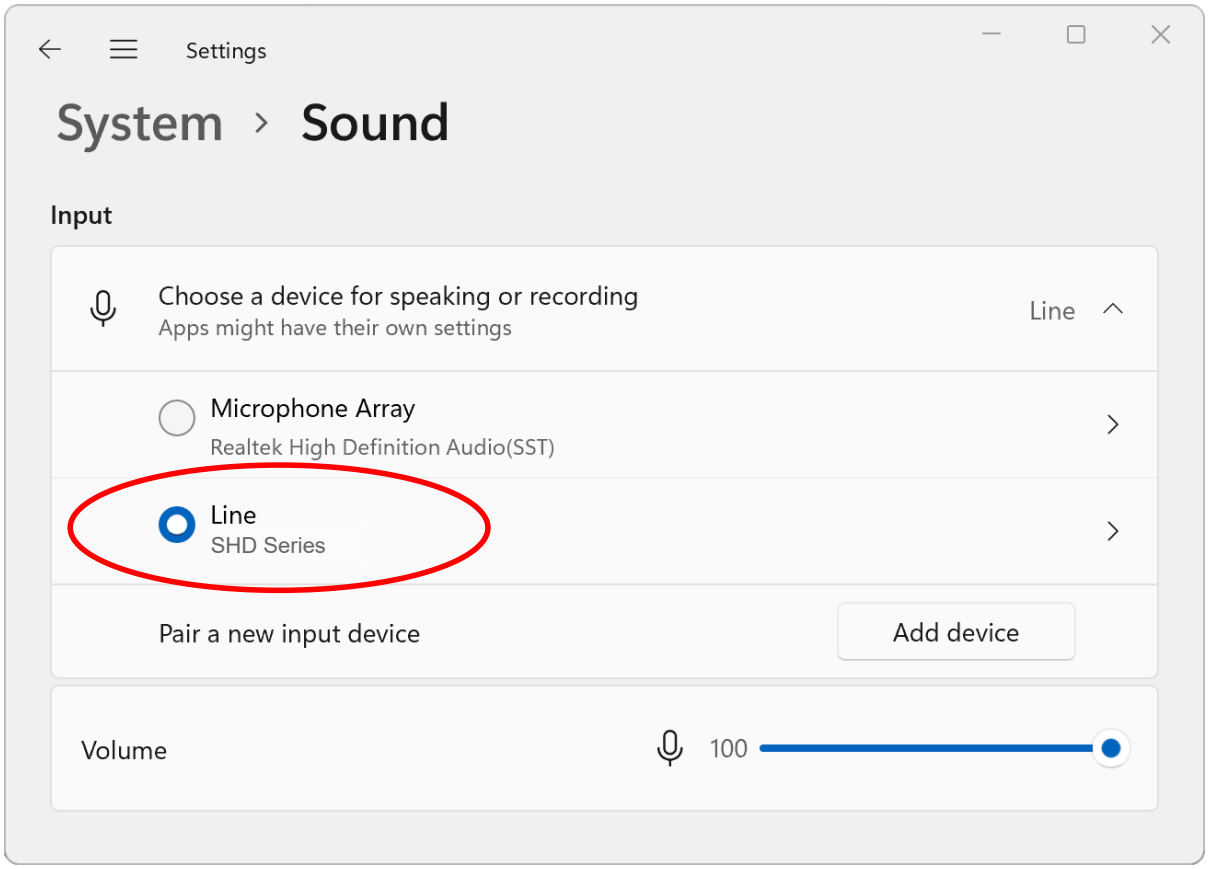
Set sample rate

To change the bit depth and sample rate, click on the rightward angle symbol **>**. Click the selector next to **Format** to pop up the sample rate menu. Sample rates up to 192 kHz can be selected:

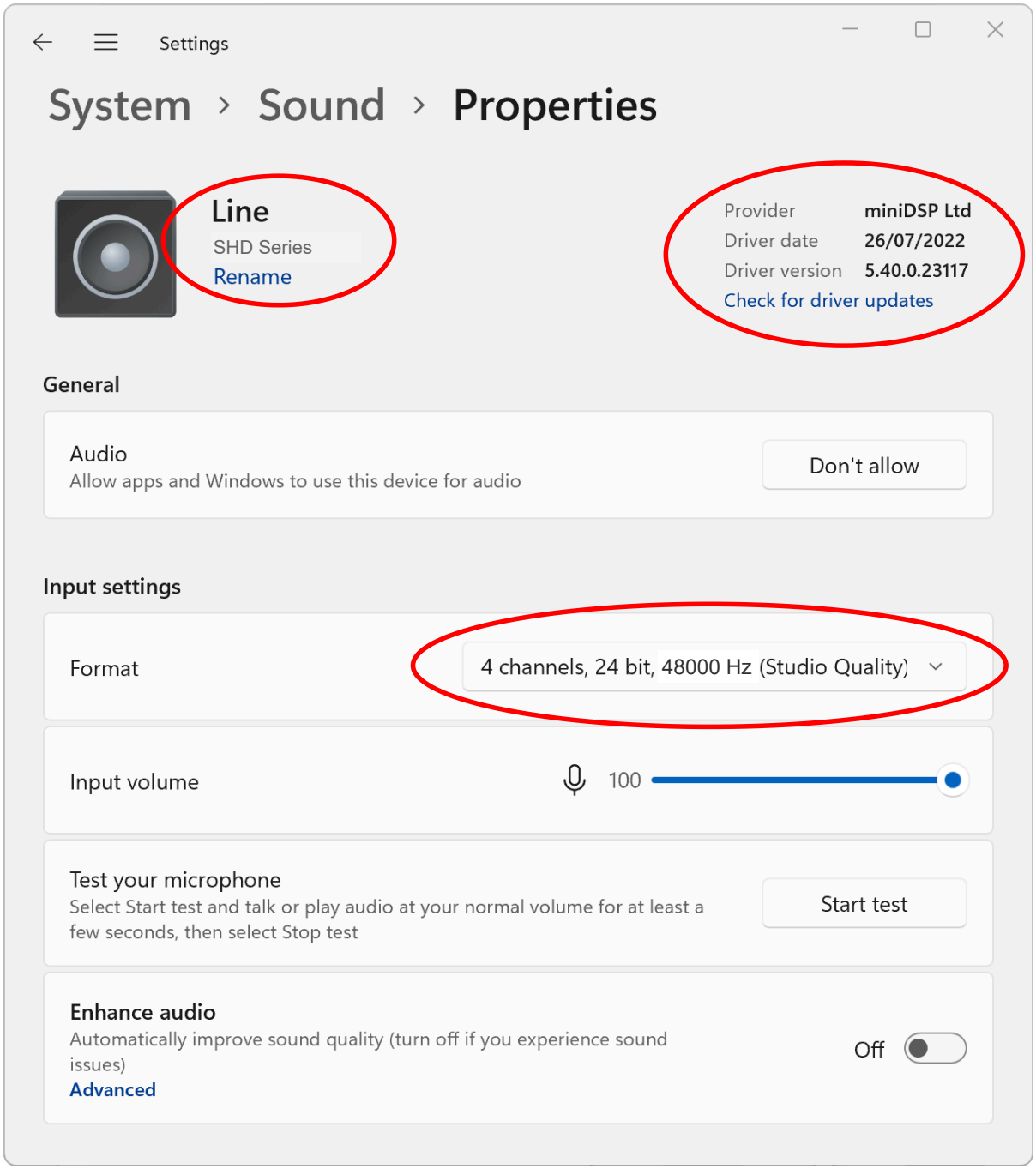


USB Audio from SHD to computer

The miniDSP SHD sends its four output channels *to* the computer over USB. These can be used to monitor or record the output channels after DSP processing:



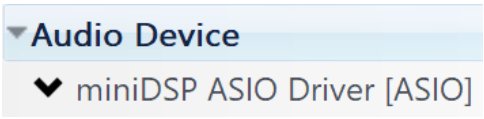
To avoid Windows resampling the outputs from the SHD, set the sample rate here to the DSP's internal sample rate: **96 kHz**.



For an example application using this feature, see the app note Analog recording with miniDSP and ocenaudio (https://www.minidsp.com/applications/advanced-tools/analog-recording-with-minidsp-adc) on our website.

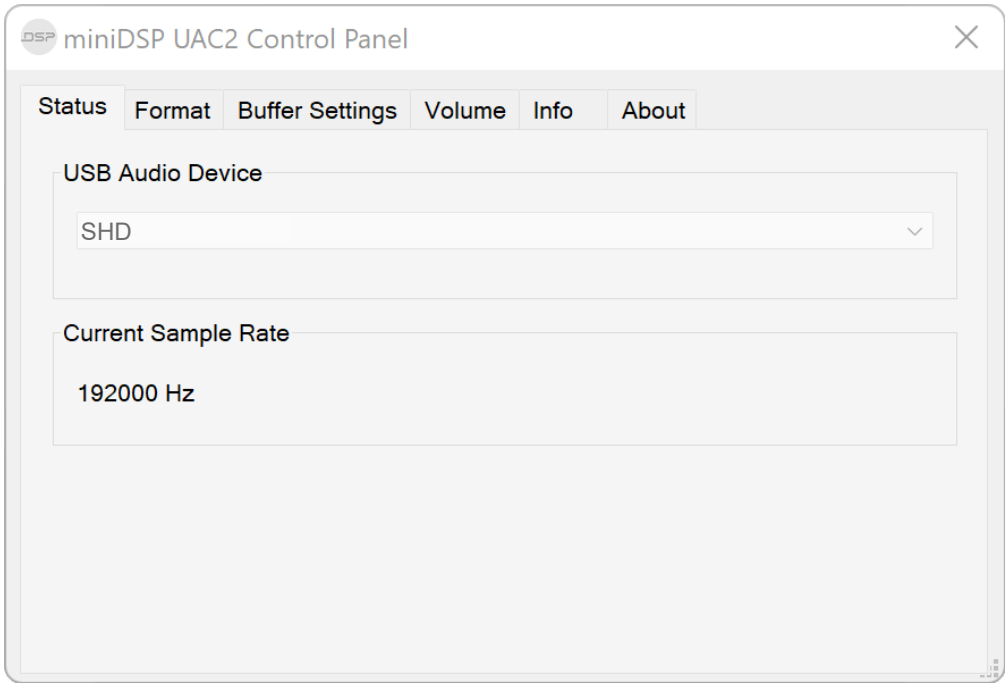
ASIO

If your audio application supports ASIO® audio drivers, we recommend selecting the miniDSP ASIO Driver in its settings. This typically allows the application to automatically change sample rate. For example, in JRiver Media Center:

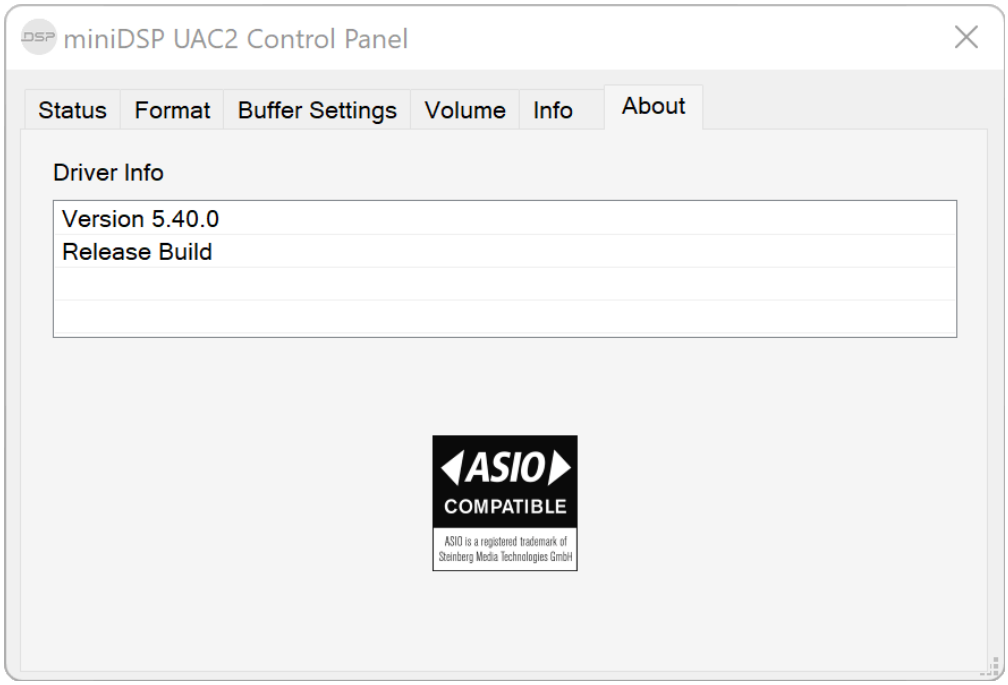


miniDSP UAC2 control panel

The current settings of the miniDSP SHD can be viewed by opening the **miniDSP UAC2 Control Panel** from the Windows Start menu (under the **miniDSP Ltd** folder). This control panel allows you to view current settings. In addition, it can be used to set buffer size, although we recommend that you leave this setting at the default. If you are having an issue with inadequate output volume over USB playback, check the Volume tab.



To see the installed version of the UAC2 driver, use the About tab:


miniDSP UAC2 Control Panel
Status
Format
Buffer Settings
Volume
Info
About
Driver Info
Version 5.40.0
Release Build
ASIO
COMPATIBLE
ASIO is a registered trademark of Steinberg Media Technologies GmbH

Remote control

The miniDSP SHD has the following options for remote control of key runtime functions.

Using the miniDSP remote

The infrared remote control provided with the SHD controls all key runtime functions.

Standby

Put the SHD into standby and take it out again.

Mute

Mute and unmute audio output.

Volume

Reduce or increase the volume. Each press changes the volume by 0.5 dB. Holding down a button will accelerate volume change to 3 dB steps.

Media control

If the selected source is USB, these buttons control audio playback. From left to right, the buttons skip back a track, play or pause audio, and skip forward to the next track.

Dirac Live

Enable or disable Dirac Live filtering. Dirac Live filtering will be effective only on presets for which Dirac Live filters have been loaded.

Source selection

Cycle through the available input sources in order: RCA (unbalanced analog), XLR (balanced analog), USB, LAN (Ethernet), TOSLINK, SPDIF (coax), AES-EBU.

Preset (1 through 4)

Switch to the selected preset. It will take a few seconds for the preset selection to complete while the processor loads the new filters from its flash memory into the DSP.

Using the miniDSP KD-1

The miniDSP KD-1 is a "smart" control device with a large physical knob for control of key functions of the miniDSP SHD. Controlled features are:

- Volume
- Mute
- Input selection
- Preset selection

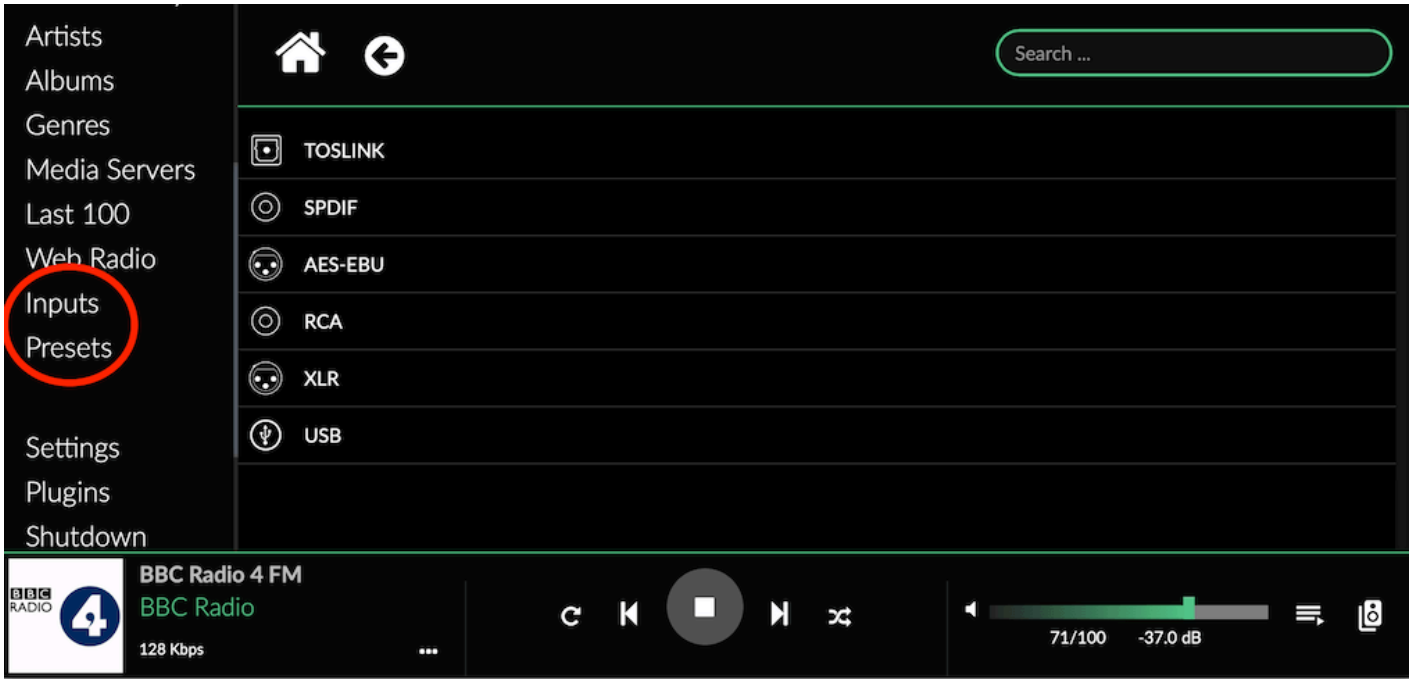
The KD-1 can also display current media metadata, such as album, track and artist names, and album artwork if available. It also provides basic playback controls.

For more information, see the KD-1 manual.

Using the Volumio web interface

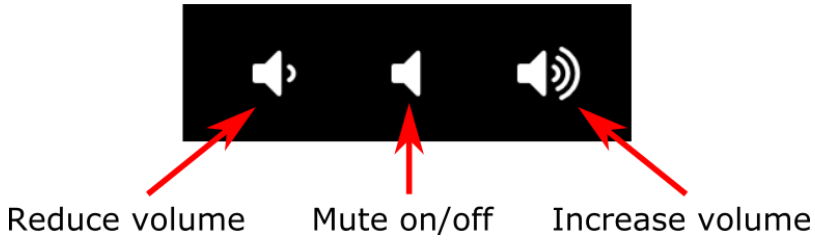
The Volumio web interface can be used to control volume, select input source and select preset.

The input source and preset selection can be accessed either from the menu on the left side of the window or from the icons on the home screen:

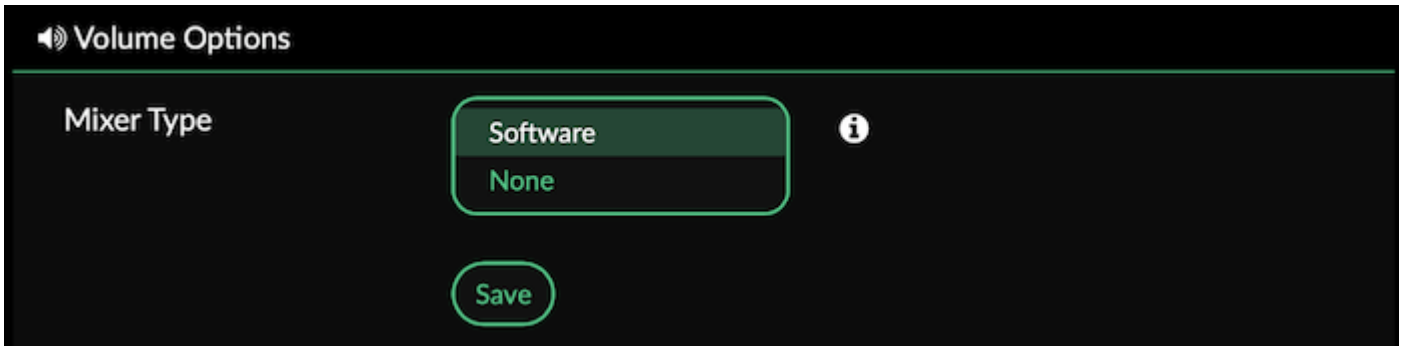


Volume control is always present at the lower right of the screen. By clicking on the currently playing item (BBC Radio 4 FM in the example), a larger control is available:

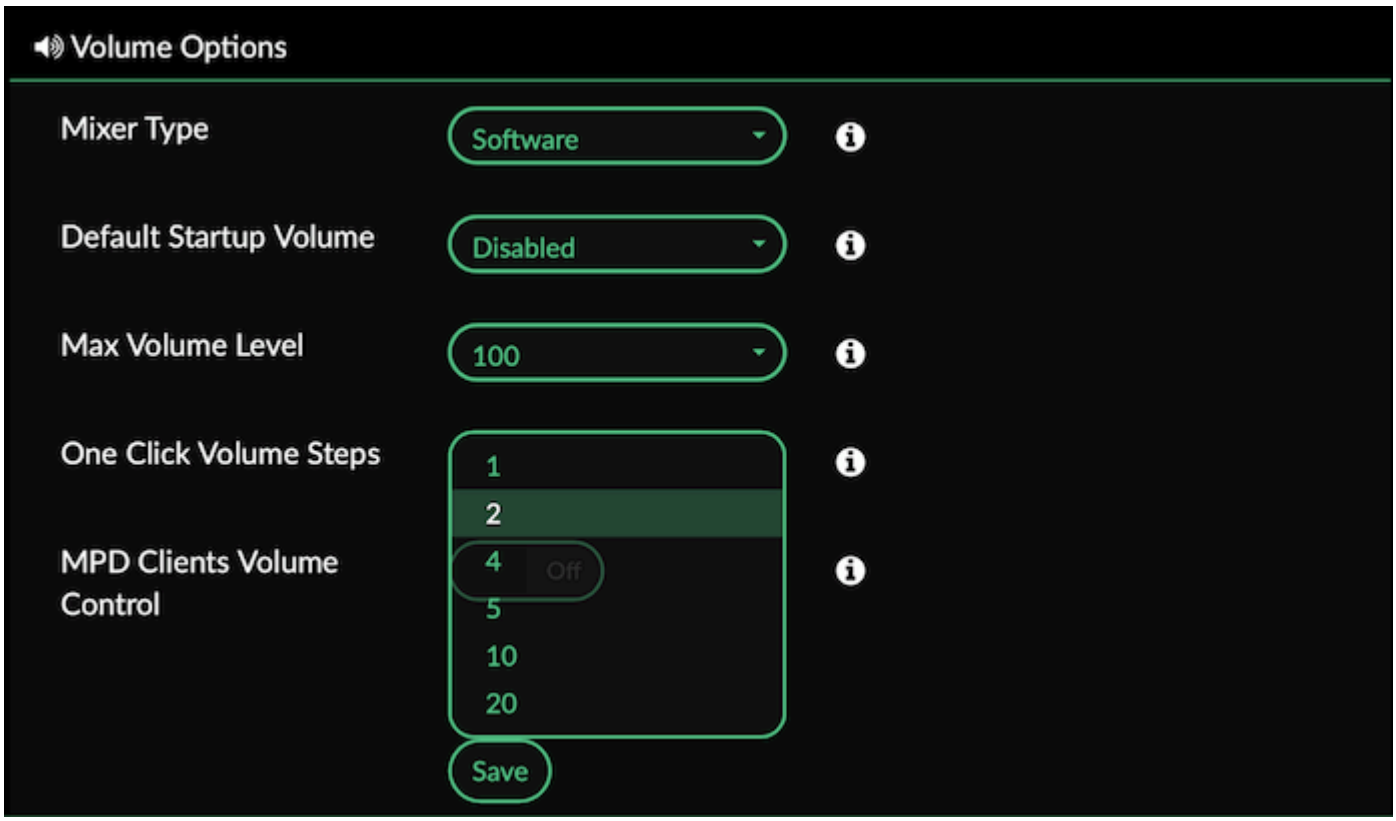
Clicking on the highlighted buttons controls the volume:



To set the size of the volume step when clicking on the buttons, go to Settings and then Playback Options. Scroll down to the Volume Options section, set Mixer Type to "Software" and click Save.



The interface will update to show additional options. Here you can set the volume step size:



Using a third-party programmable remote

A third-party programmable remote can be used with the miniDSP SHD. See this page on our support site for the codes to use:

- https://support.minidsp.com/support/solutions/articles/47001137495-ir-commands-for-minidsp-products (https://support.minidsp.com/support/solutions/articles/47001137495-ir-commands-for-minidsp-products)

Programming a Logitech Harmony remote

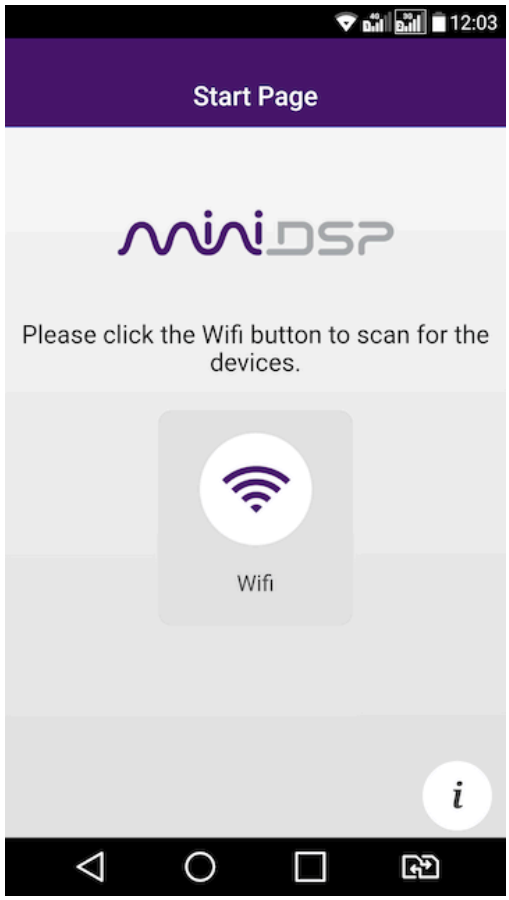
The miniDSP SHD can be used with a Logitech ® Harmony ® remote. The same functions as the stock remote are programmed into the Harmony database. In addition, you can set up buttons for direct input source selection (instead of cycling through input sources).

- Using a Harmony Remote with the miniDSP SHD (https://www.minidsp.com/applications/audio-streaming/shd-with-harmony-remote)

> **Info**
>
> **Logitech** and **Harmony** are registered trademarks of Logitech.

Android/iOS control app

With the addition of a miniDSP Wi-DG (https://www.minidsp.com/products/accessories/wi-dg) Wi-Fi to USB bridge, the miniDSP SHD can be remote-controlled from a phone or tablet running Android or iOS (iPhone/iPad).



For more information, see this application note:

- Using Android / IoS app to control your miniDSP (https://www.minidsp.com/applications/advanced-tools/android-ios-app-control)

If you're keen to just get started, here are the direct links to the app:

- Android version on Google Play store (https://play.google.com/store/apps/details?id=com.dsp4you.minidsp&hl=en)
- iOS version on iTunes store (https://itunes.apple.com/us/app/minidsp-control-app/id945240204?mt=8)

> **Warning**
>
> If the USB port is being used for iOS/Android app control via the Wi-DG, it cannot be used for USB Audio streaming.

Network Audio

Getting started with network audio

Overview

The miniDSP SHD incorporates a custom version of the popular network audio endpoint Volumio (https://volumio.com/en/) , running on its own ARM CPU inside the SHD chassis. Volumio has a wealth of functions for controlling and delivering network audio.

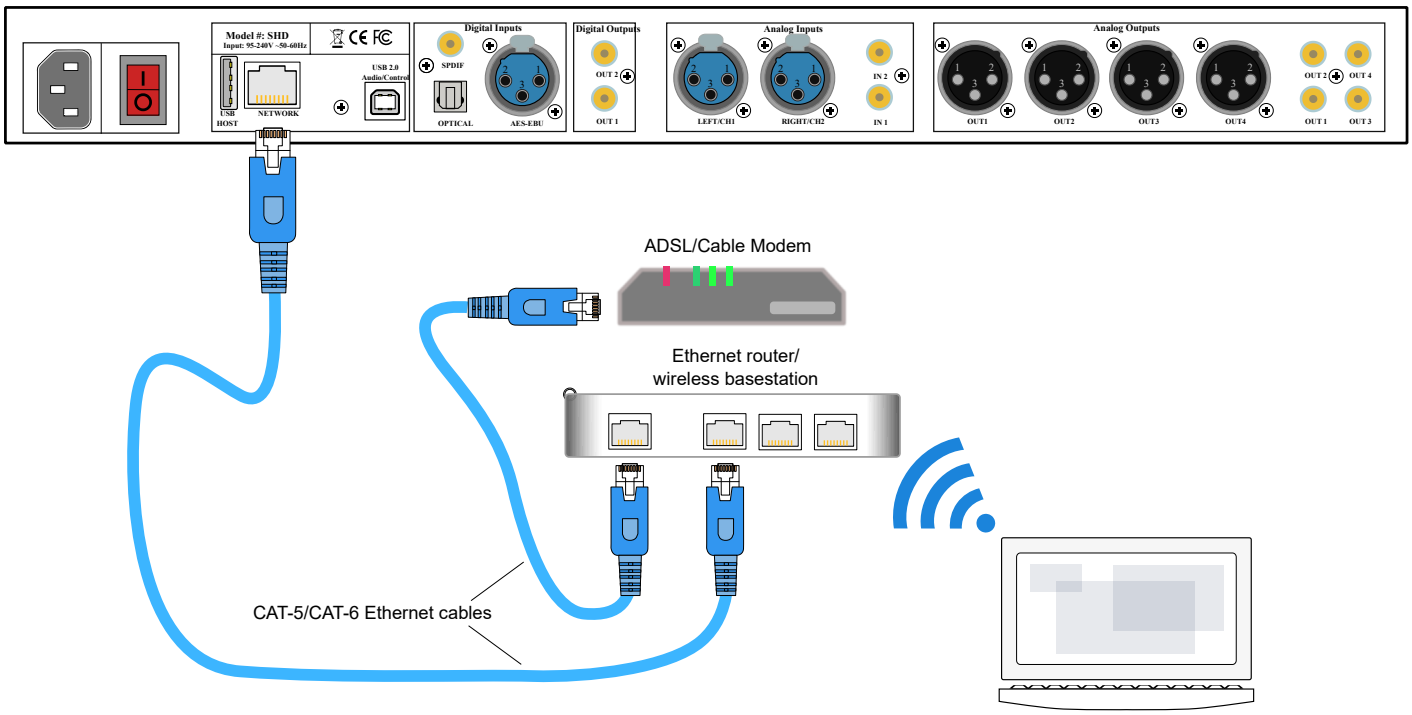
Please note however that since Volumio and the other software mentioned in this chapter is third-party software, miniDSP Support for this software is *limited*.

> **Info**
>
> While the miniDSP SHD contains an ARM processor running Linux for network streaming, miniDSP **does not support** any additional software installation or custom Linux builds on this processor.

> **Info**
>
> This manual describes Volumio 3, the current version. If you have been using the miniDSP SHD with Volumio 2 (prior to November 2023), you will be able to upgrade to Volumio 3 using the over-the-air update.
>
> **Notice:** Volumio 3 is a major OS update, so we have to perform a clean install to guarantee 100% safe operation. This means that you will lose all your Volumio settings, configuration, and playlists. (Music files will not be deleted. DSP configurations and Dirac Live filters will also not be affected.) **Be sure to write down any settings that you will need BEFORE you start the update.** When the update completes, you will have a "fresh" system that you will then need to configure.
>
> For more information, see the page Updating Volumio.

Ethernet connection

Connect an Ethernet cable from your home network router to the Ethernet port on the rear panel of the SHD. This is a typical example:

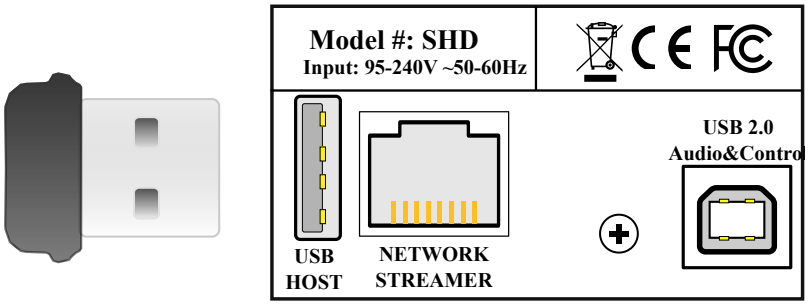


A short Ethernet cable is provided with the unit. If a longer cable is required, these are readily available from computer stores and online. The recommended maximum length of Ethernet cables is 100 meters (330 feet).

Note that your router must be set to allow dynamic IP addresses i.e. DHCP. Most routers will have this function enabled by default.

Wi-Fi connection

Insert the provided Wi-Fi adapter (aka "dongle") into the USB Host port on the back of the SHD.

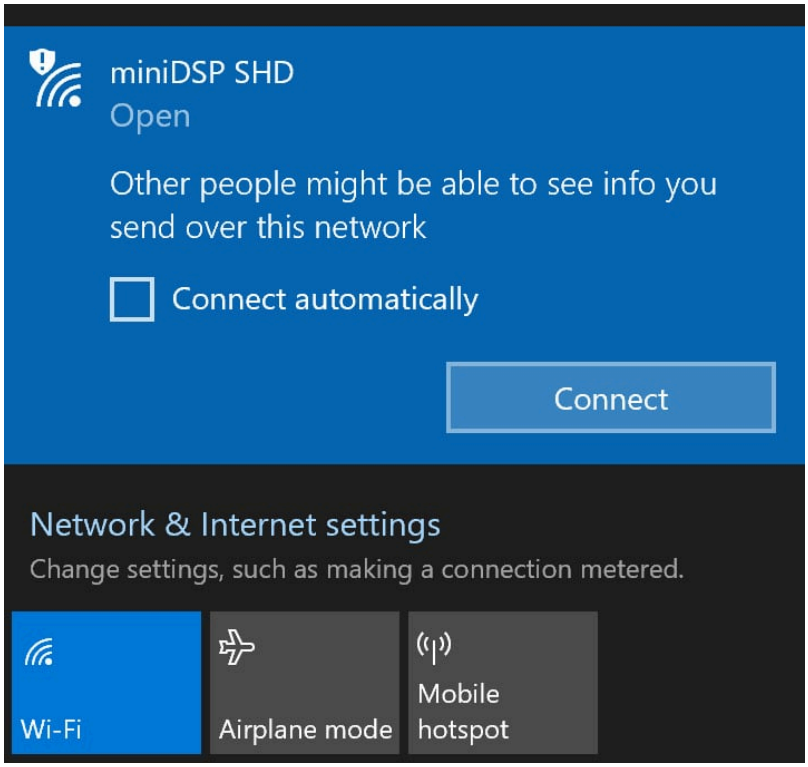


To connect Volumio to your wireless network, you will need to access its interface first. You can do this either with an Ethernet cable as a temporary connection, or by using Volumio's inbuilt hotspot.

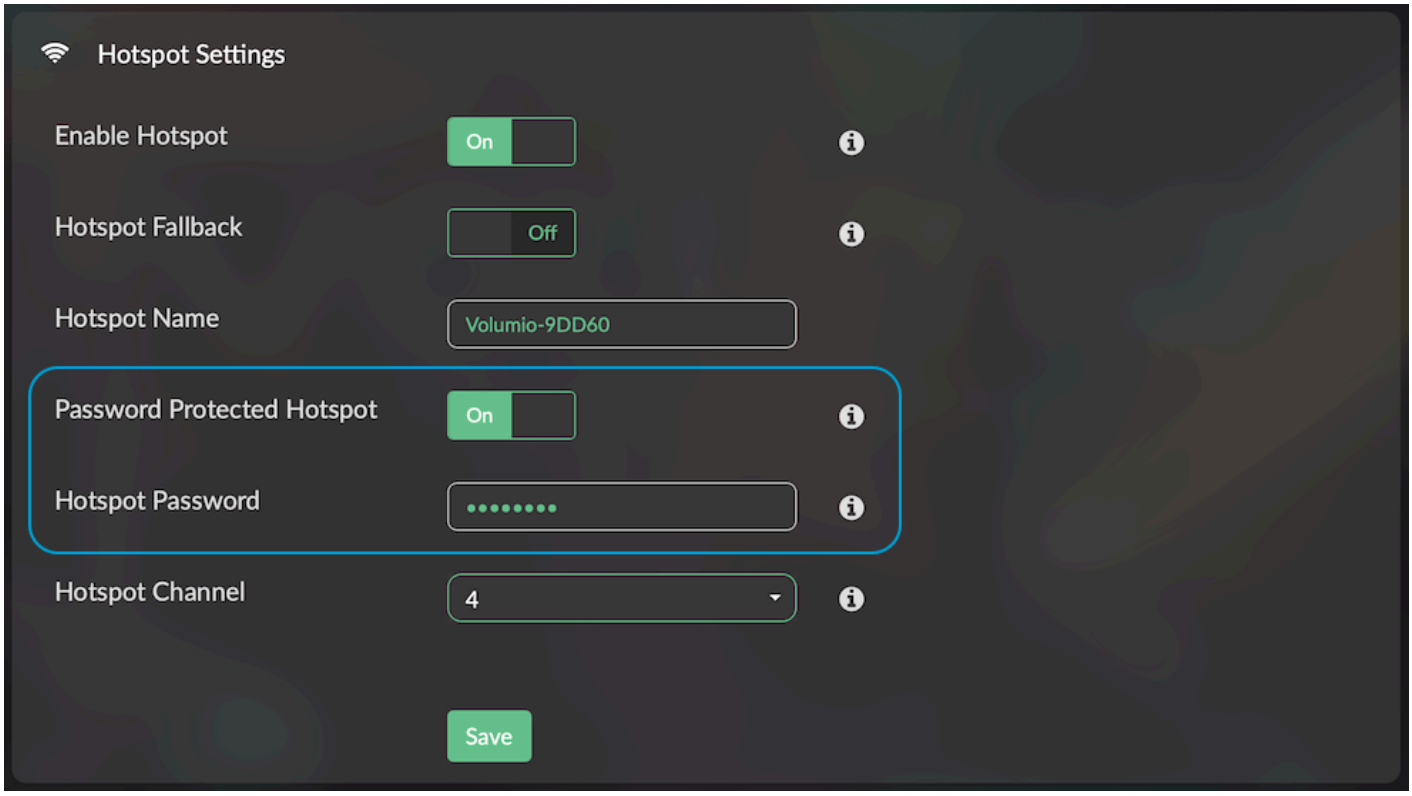
Connecting to the hotspot

If the SHD has a Wi-fi dongle plugged in and is unable to connect to a wireless network, it will start up its own hotspot. You can use this to access the Volumio interface in order to set up connection to your regular Wi-fi network.

To begin, use your computer's network manager to search for a wireless hotspot named **Volumio xyz**. ("xyz" is a random selection of letters and numbers.) Select this hotspot and connect to it. No password is needed.



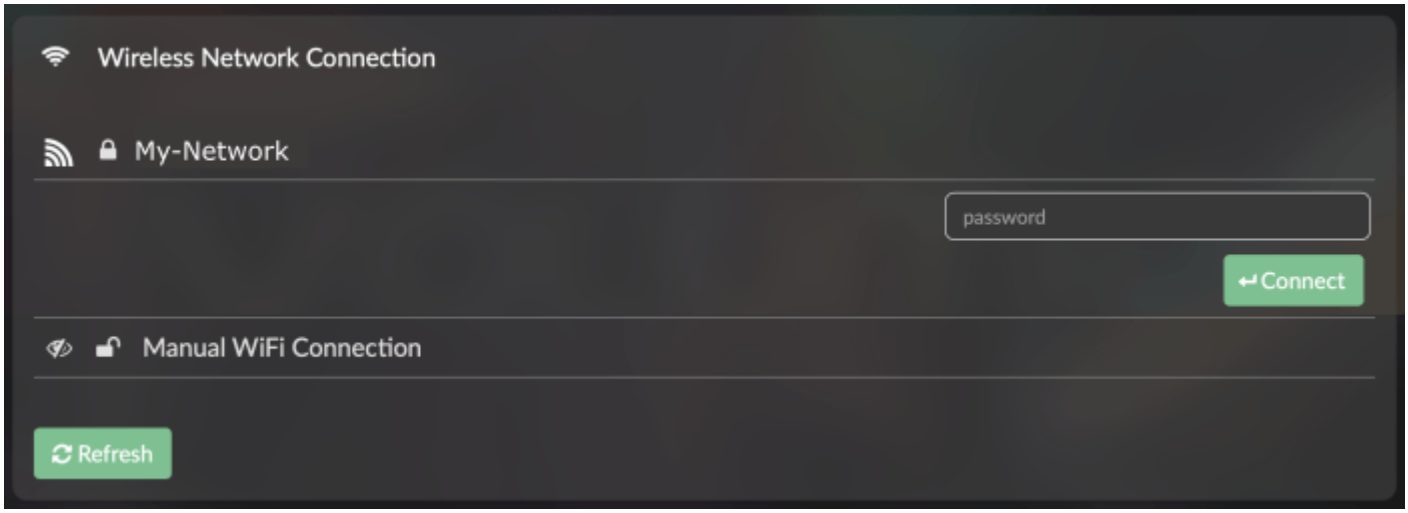
When the hotspot connects, the Volumio interface will automatically open at the setup wizard (see below for more details). We recommend that you now enable the hotspot password on the Network settings screen:



While you can access the Volumio interface through the hotspot, it is really intended for temporary use. See the next section to connect Volumio to your normal wireless network.

Connecting to a wireless network

Go to the Main menu, select **Network** and scroll down to the Wireless Network Connection section. Locate your network in the list and click on it. Enter your Wi-Fi network's password and click **Connect**:



If you have a hidden network, use the Manual WiFi Connection option.

After clicking on Connect, the miniDSP SHD will close the hotspot. It is now joined to your wireless network. Disconnect your computer from the Volumio hotspot and reconnect it to your wireless network. Follow the procedure below to open the Volumio web interface.

> **Tip**
>
> Once you are reconnected to Volumio through your regular Wi-fi network, we strongly recommend using the Network settings to add a password to the hotspot. This will ensure that your miniDSP SHD does not broadcast an open hotspot if it is unable to connect to your Wi-Fi network for some reason in the future. Alternatively, you can disable the hotspot completely.

Connecting to the Volumio web interface

To open the Volumio web interface, click on one of the following:

- http://minidsp-shd/ (http://minidsp-shd/)
- http://minidsp-shd.local/ (http://minidsp-shd.local/)

Depending on your network setup, one may work while the other will not. If neither works, you will need to connect to the web interface by IP address. In that case, see Finding the IP address.

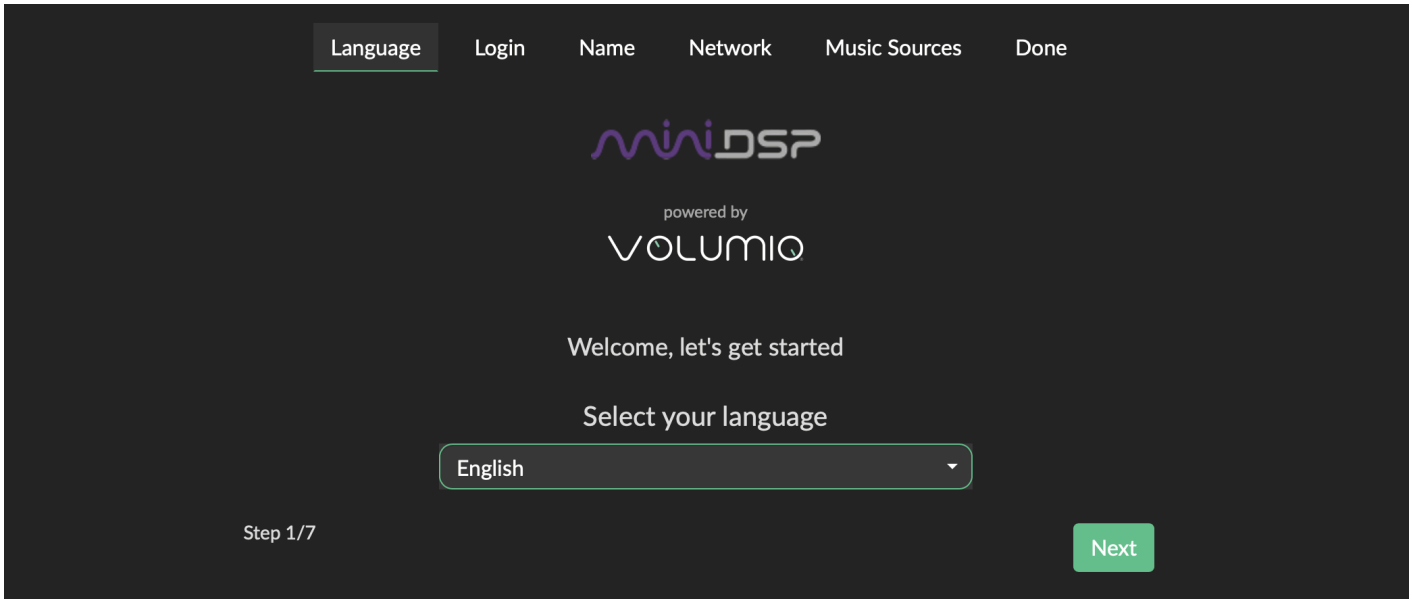
When you connect to the interface for the first time, you will enter a simple setup wizard.

The Volumio setup wizard

On first connection, Volumio will step through a few simple setup screens. You can repeat the setup wizard at any later time by navigating to the System settings and clicking on "Run First Config Wizard."

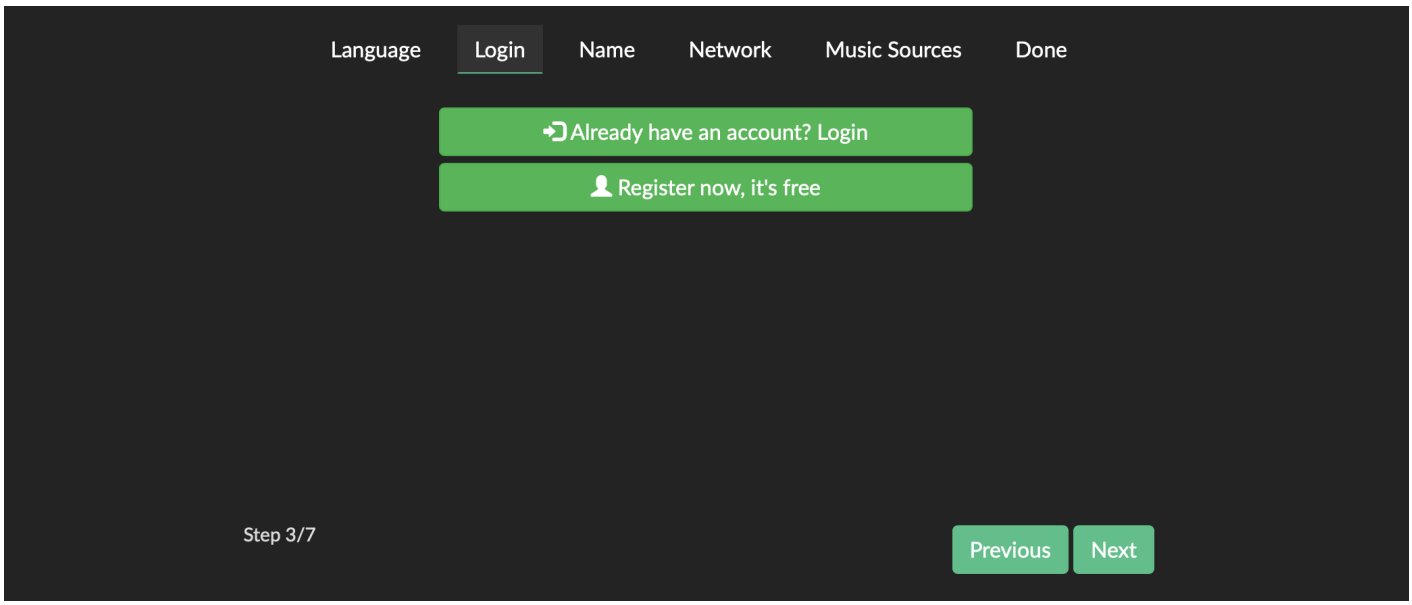
Language

This should be self-explanatory.



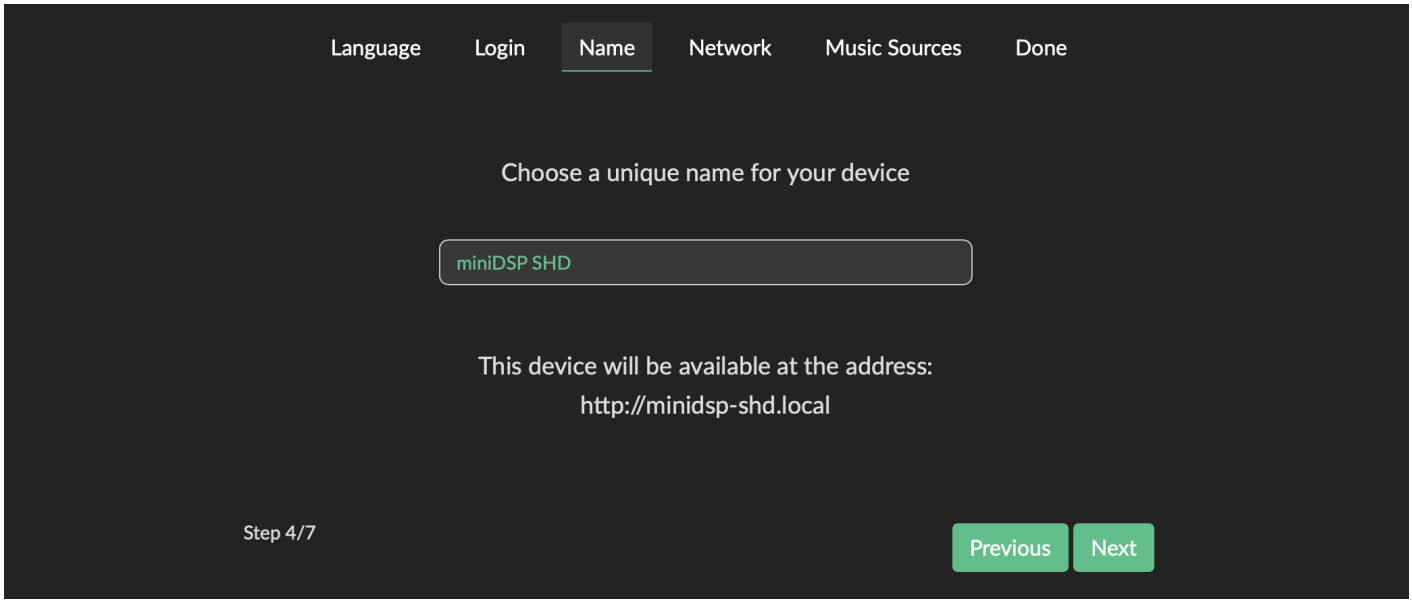
Login

This screen asks you to log in or to create a free Volumio account so you get access to all Volumio Premium features free of charge. Simply click on the "Register Now, It's free" button.



Name

This screen sets the name of your device. By default, it will be accessible on the network as "minidsp-shd" or "minidsp-shd.local".

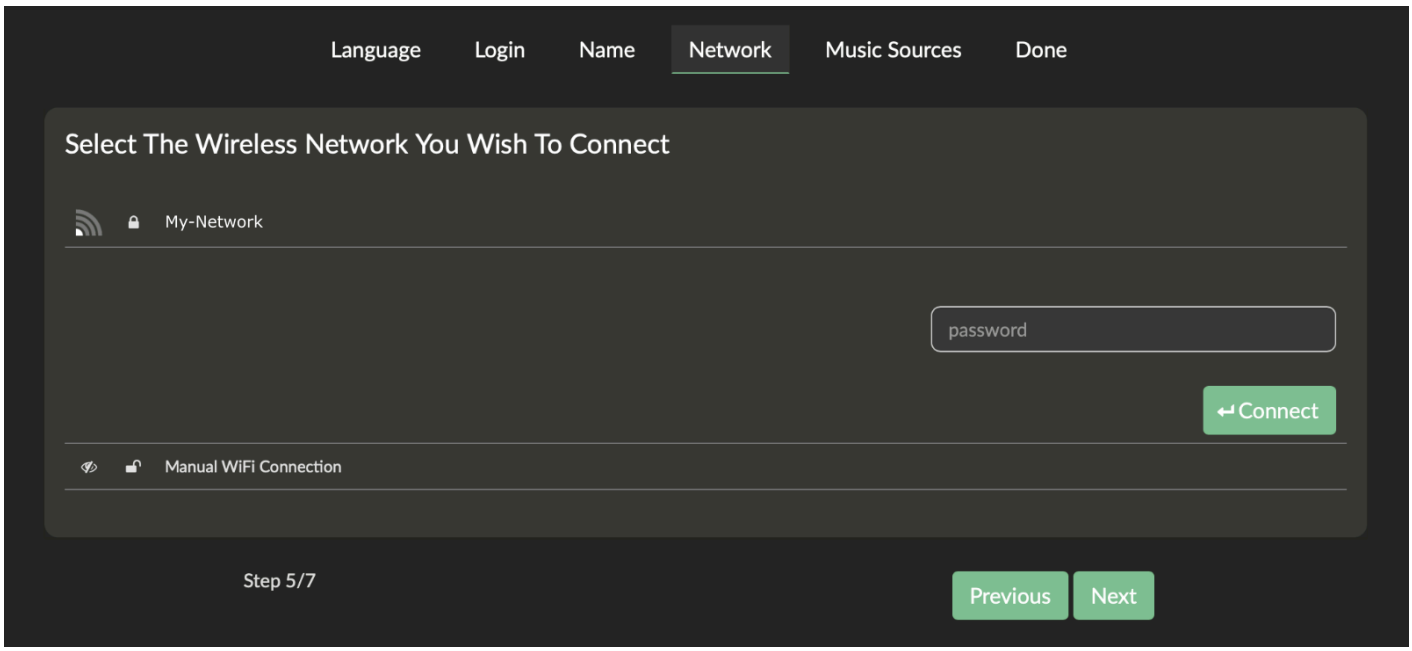


If you have more than one SHD Series (SHD, SHD Studio, or SHD Power) processor on your network, you should change its name now. After completing the wizard, you will need to restart the SHD and access the web interface again through its new address as shown on the screen below the name you enter.

Network

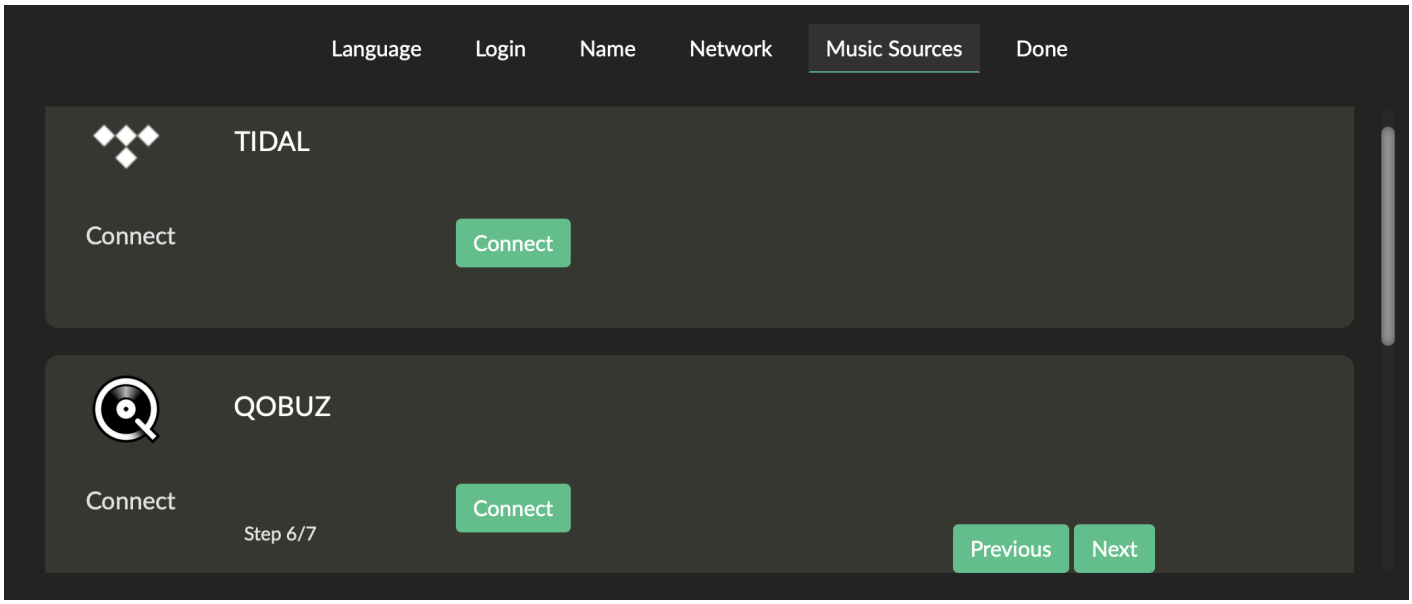
This screen appears only if you have a Wi-fi dongle inserted into the SHD. Use it to connect to your regular Wi-fi network: select your network, enter its password, and click Connect.

If you have a hidden network, use the Manual WiFi Connection option.



Music Sources

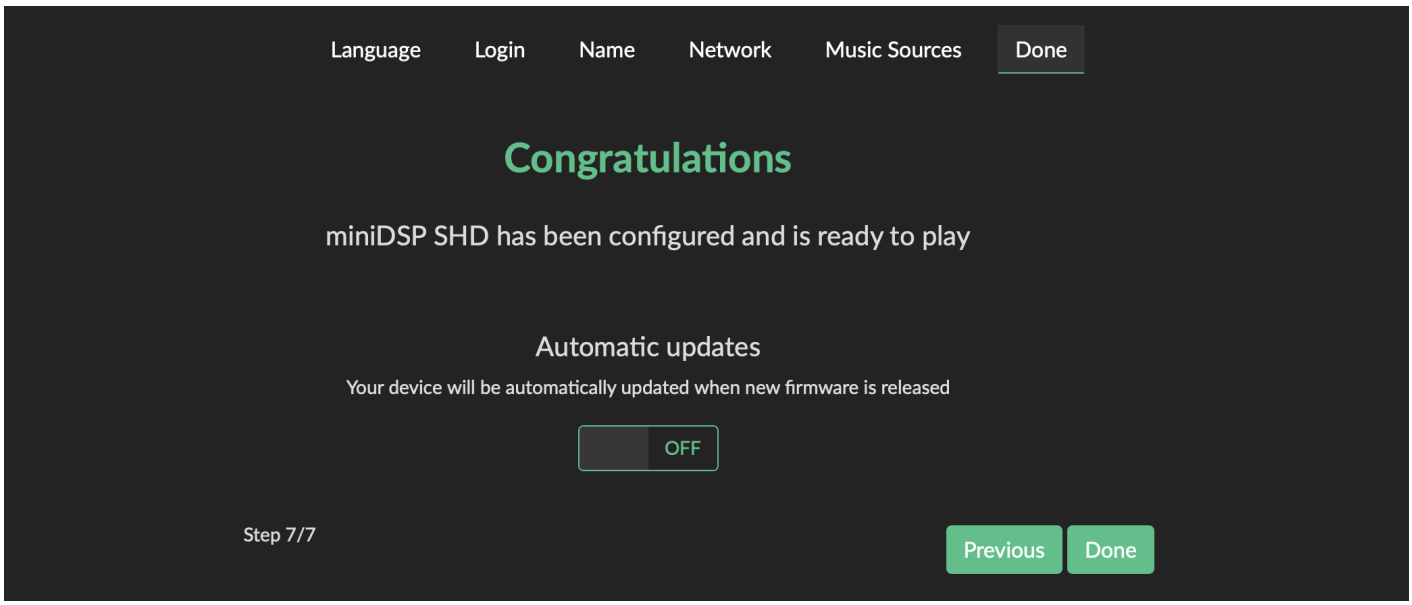
Use this screen to log into your Qobuz, TIDAL or HighresAudio account. You can also do this later from the **My Music** settings page.



Done

Enable automatic Volumio updates here if you wish, then click Done. Note that the updates apply only to the Volumio software, they do not apply to the Device Console or the SHD firmware.

If you do not enable automatic updates, you can update manually by going to the System settings and clicking Check Updates.


Language
Login
Name
Network
Music Sources
Done
Congratulations
miniDSP SHD has been configured and is ready to play
Automatic updates
Your device will be automatically updated when new firmware is released
OFF
Step 7/7
Previous
Done

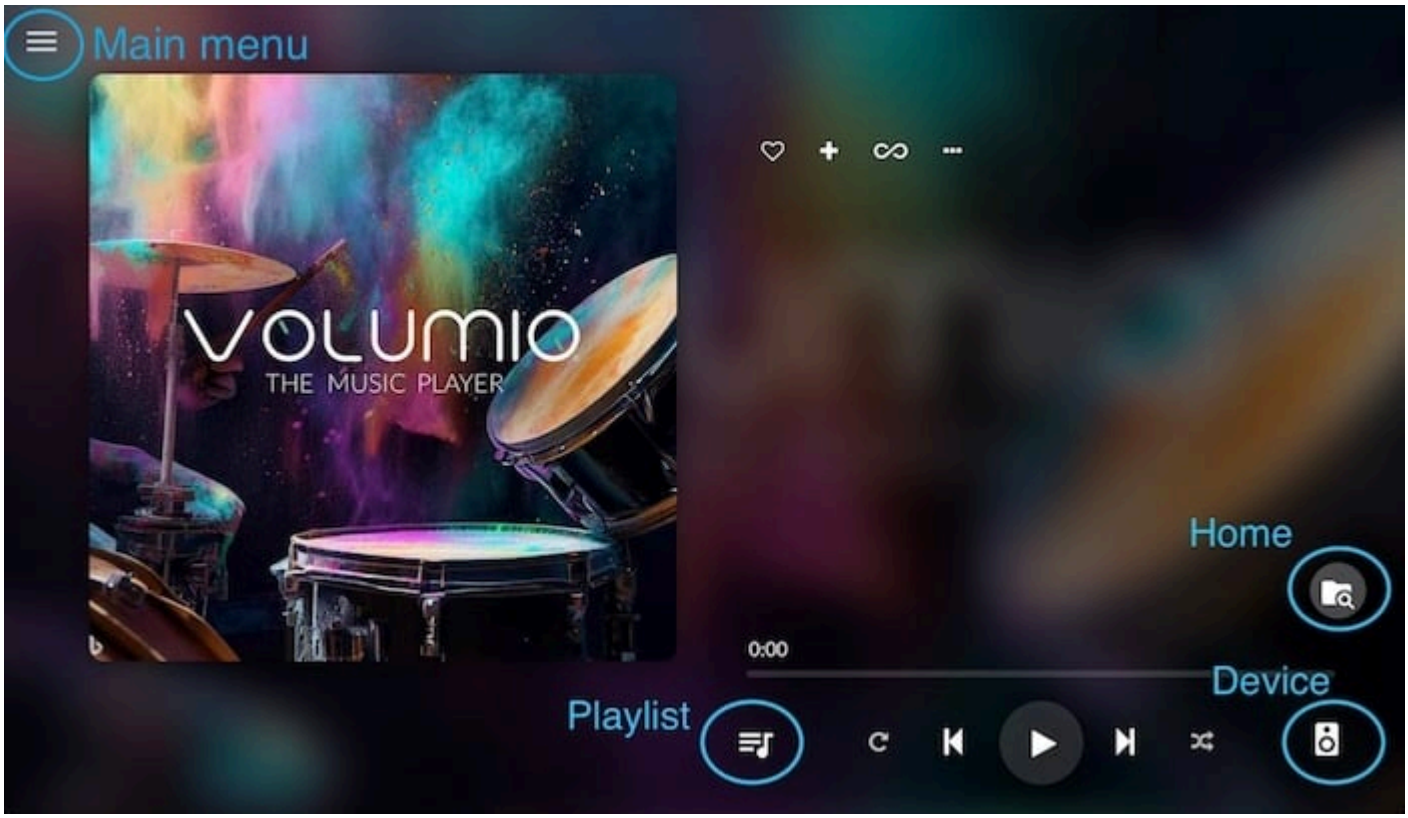
Using Volumio

This page provides an overview of the Volumio web interface and how to play music. See the other pages in this section for information on specific network streaming services (Roon, Qobuz, TIDAL and Spotify).

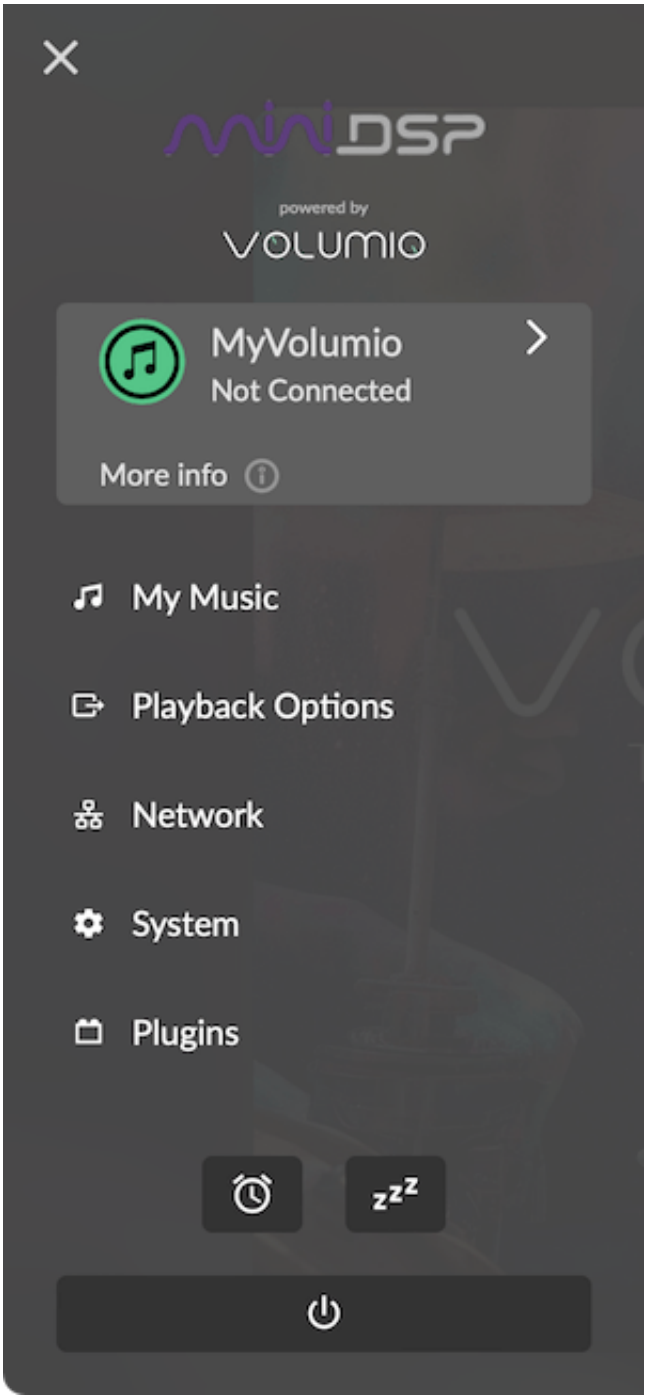
Before proceeding, use the front panel encoder or the remote control to select the LAN input source:

A quick tour

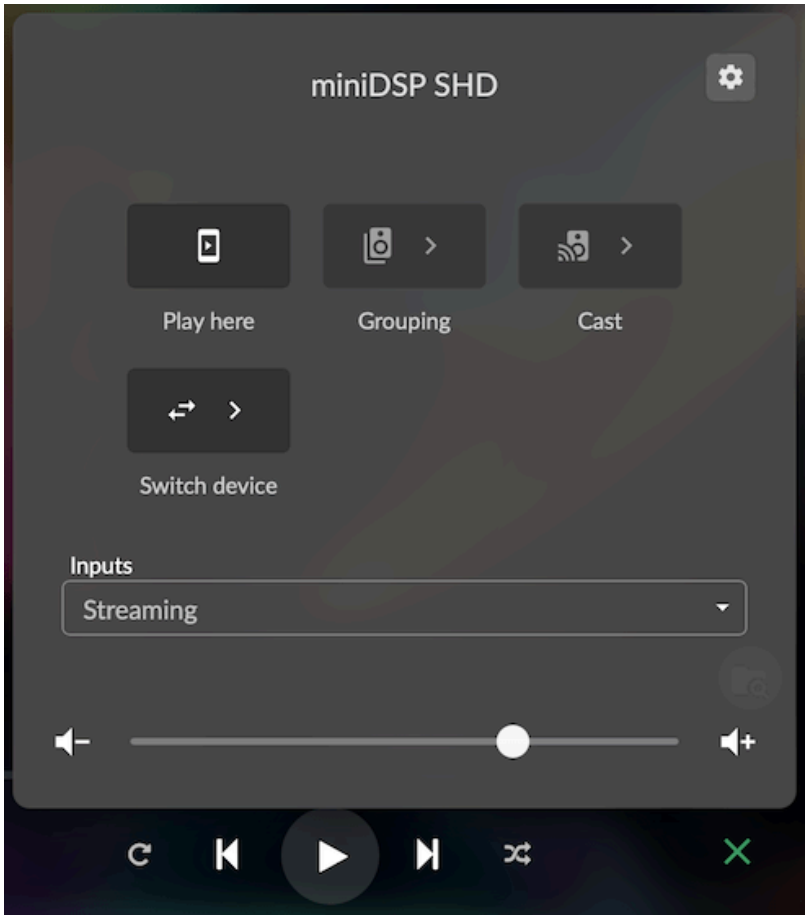
The default Volumio interface with key items highlighted is shown in this screenshot:



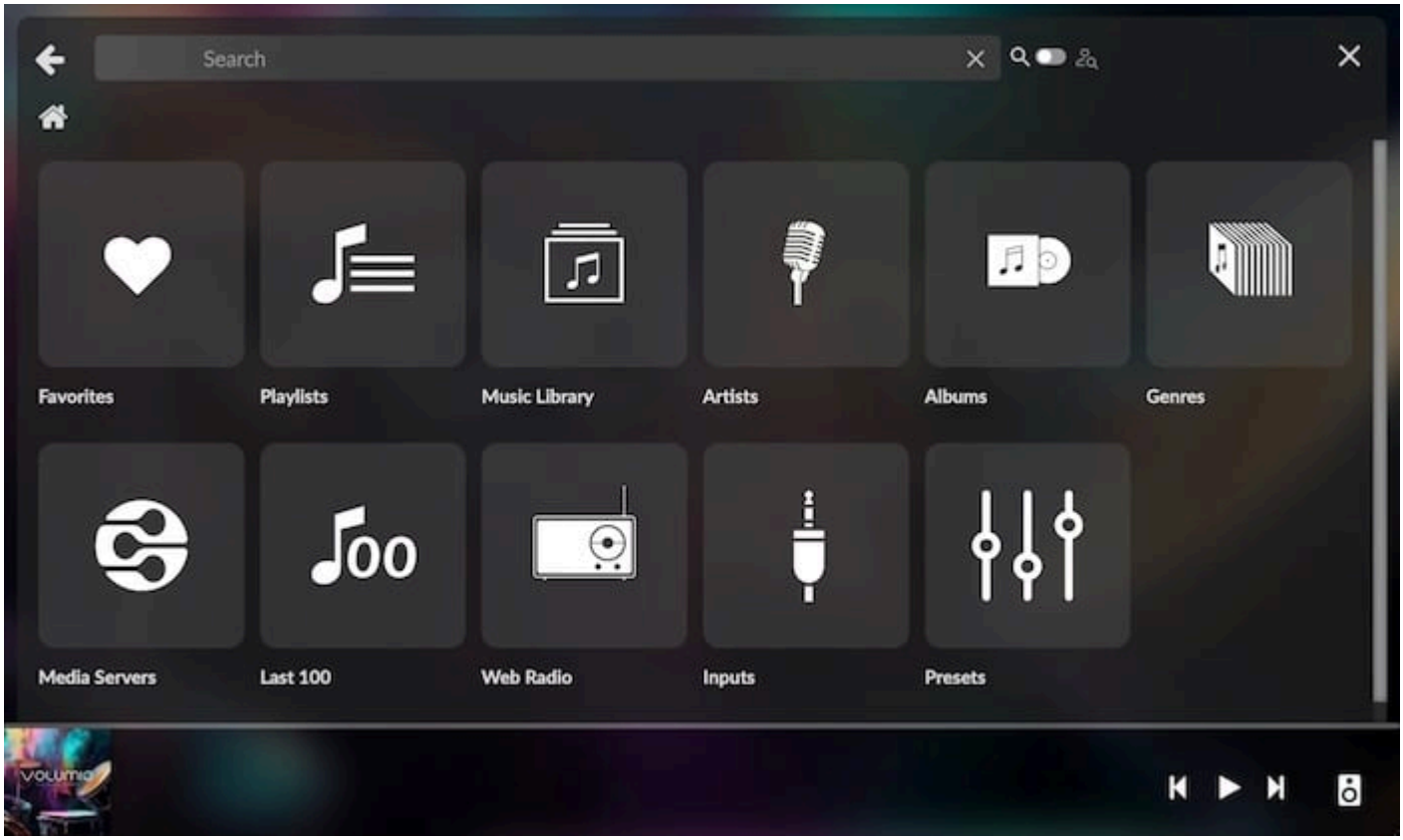
The hamburger menu at the top left brings up the main menu in a sidebar. The items in this menu will be mentioned on this and related pages. For now, note that if the Volumio processor needs to be restarted, this can be done with the button at the bottom of the menu:



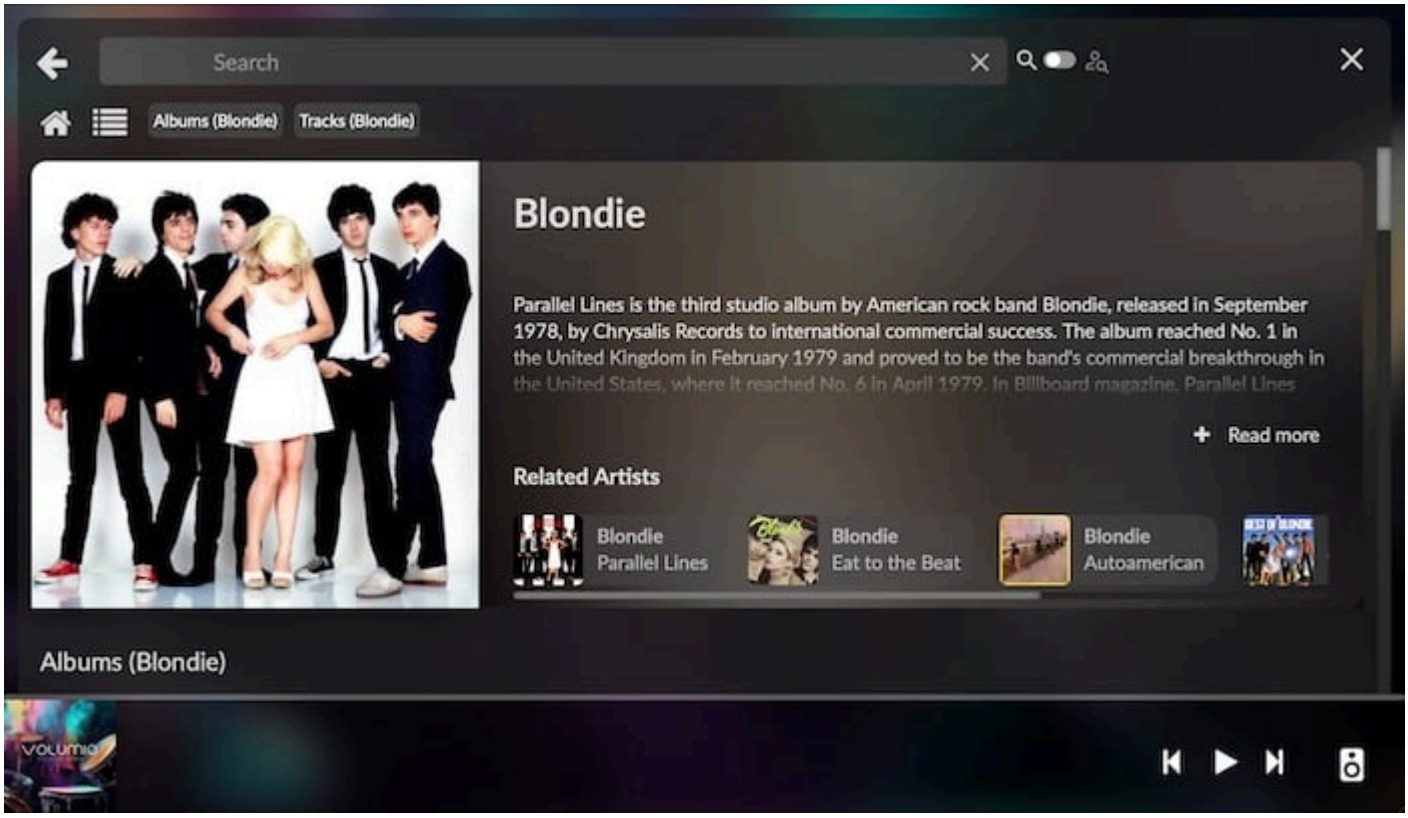
The "Device" button brings up an overlay that controls several network playback features:



The "Playlist" button displays the current playlist. The button marked "Home" leads to the main music navigation screen:

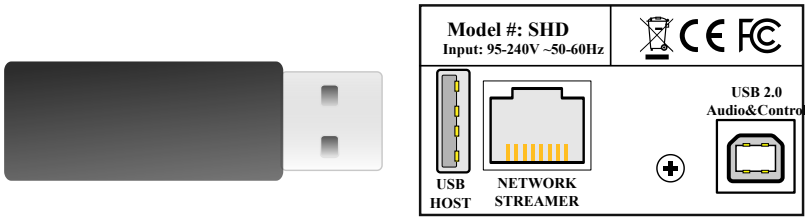


From here you can browse music in your library. (Below we will list different ways to add music to the library.) For example, you can view a particular artist:



Playing audio from USB stick

A simple way to get started with music playback via Volumio is with music files loaded onto a USB stick. Insert the USB stick containing music files into the USB HOST port on the rear panel, next to the Ethernet port.



> **Info**
>
> It is not possible to play audio from a USB stick if using the Wi-Fi dongle, as there is only one USB host port.

Volumio will start indexing the USB stick. Navigate to the Home screen, where you will be able to browse the files by folder (click on Music Library, then USB, then on the name of the USB stick), by artist or by album.

> **Tip**
>
> If, after removing the USB stick, all albums are not removed from the Volumio Library, go to My Music from the Main menu and click **Rescan**.

Playing files over the network

The SHD supports many ways of playing files over the network. Some of the streaming services are described in more detail on following pages. For music files located on your own local network, there are several options:

- Use a DLNA media server. These can be accessed from Home → Media Servers. This method allows a more powerful processor located on (for example) a NAS to do the "heavy lifting" of indexing your music library.
- Mount a shared folder directly over the network to Volumio. This function is provided in My Music → Network Drives.
- Stream directly to the SHD from an app running on a mobile device or computer.
- Use Roon. Roon is described more on the Roon page.

More notes and hints are collected in our audio streaming app notes (https://www.minidsp.com/applications/audio-streaming) library.

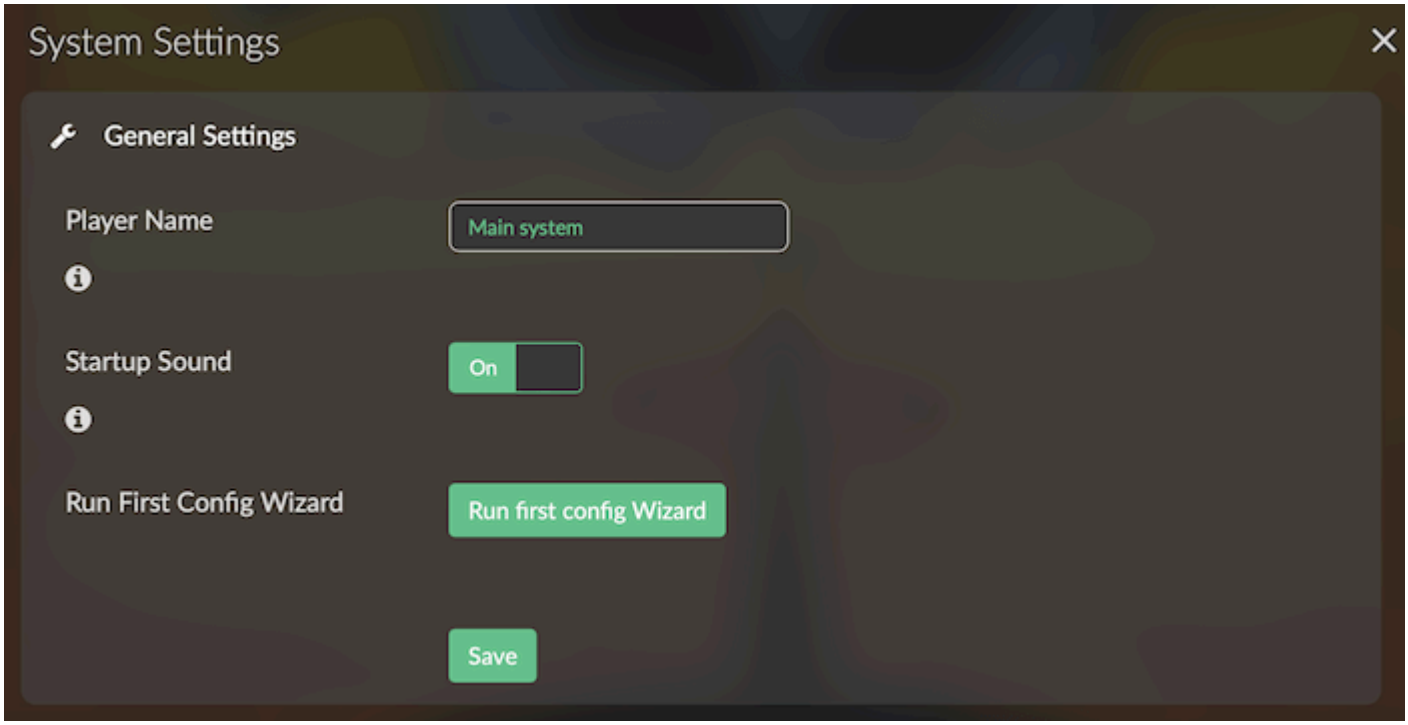
Using multiple processors

More than one SHD Series (SHD, SHD Studio, SHD Power) processor can be controlled from the same web interface screen. Furthermore, Volumio supports synchronized multi-room playback.

Setup for multiple processors

Each SHD Series processor on your network must have a unique name. Follow these steps:

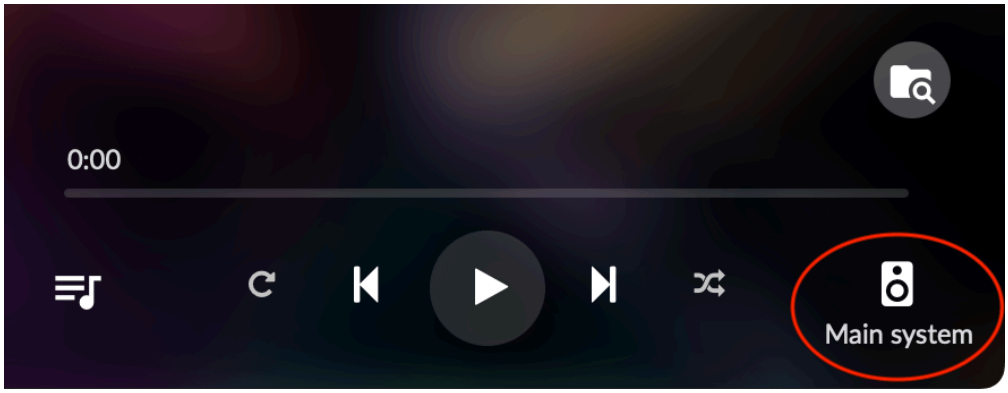
1. On the first SHD, navigate to System Settings and set Player Name to something unique, then click Save. In our example, we used "Main system":



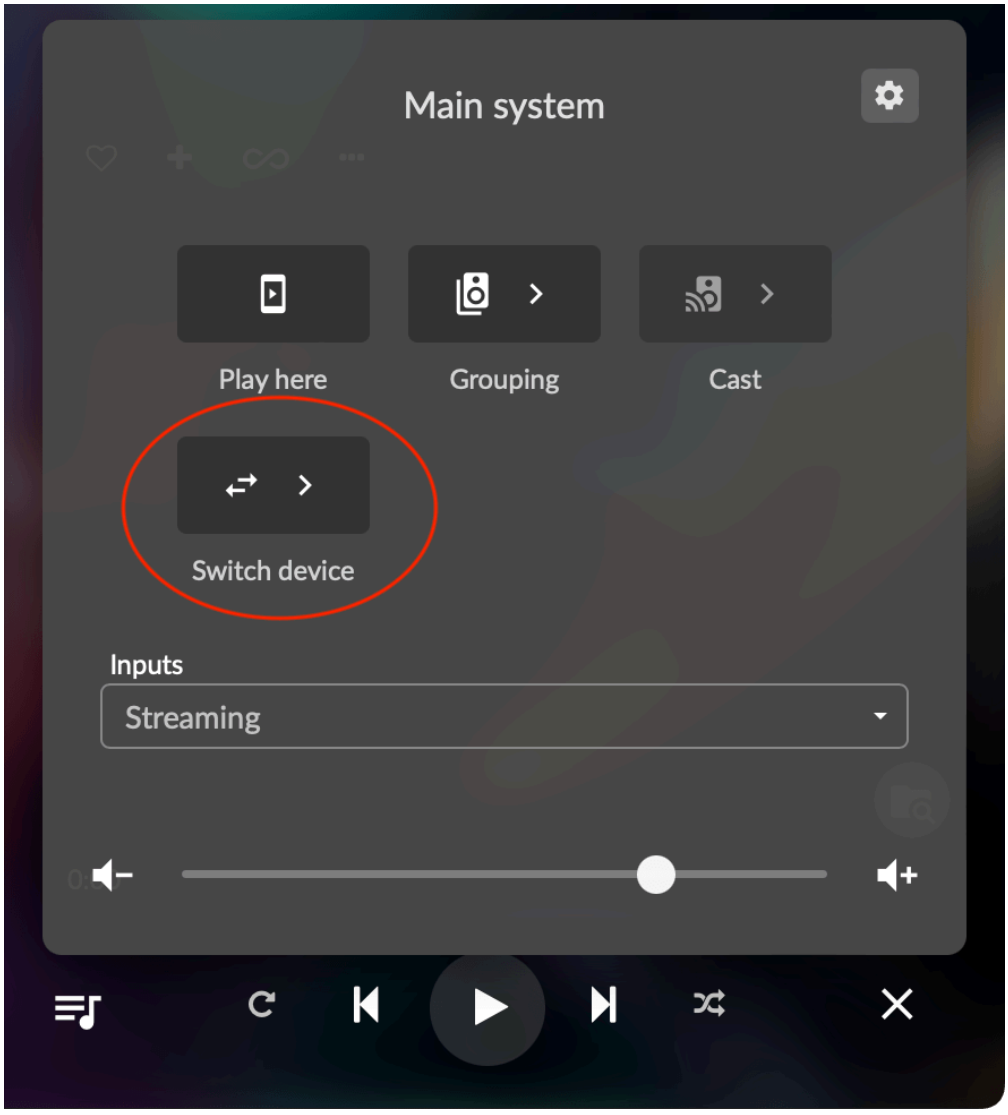
1. Restart Volumio (use the button at the bottom of the main menu and select the Restart option).
2. To reconnect to the interface, use the new name. In our example, it will be http://main-system/ or http://main-system.local/.
3. Connect and turn on the second SHD. Connect to it at http://minidsp-shd/ (http://minidsp-shd/) or http://minidsp-shd.local/ (http://minidsp-shd.local/) and change its name away from the default as above. In our example, we used "Study system" for the second SHD. Select Shutdown and then Restart.
4. Re-open the web interface using one of the **new** names. If you used spaces in the name, replace the spaces with hyphens. For example, in our case we connected to http://main-system/ (http://main-system/) .

Switching between processors

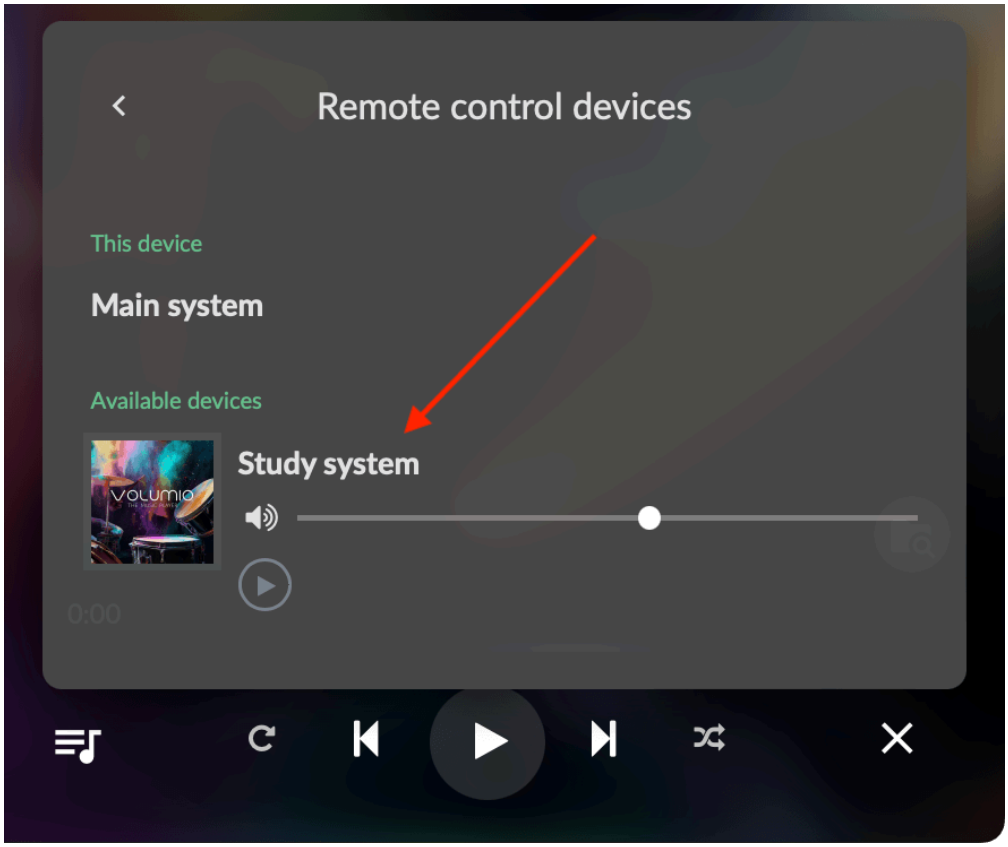
At the lower right of the screen, you will see the name of the processor that is currently being controlled:



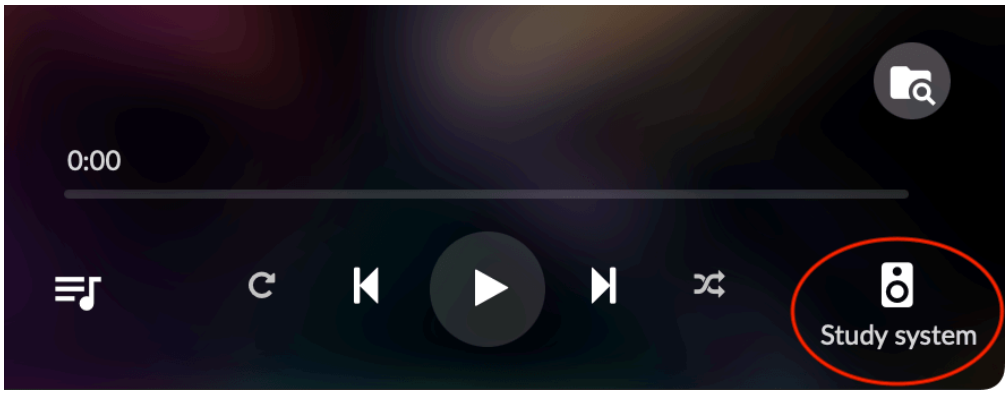
Click on the name to bring up the control panel, then click on "Switch device":



Click on the name of the device that you want to control:



Close the pane (click on the "x" at the bottom right). The name of the device that is now being controlled will appear at the lower right:

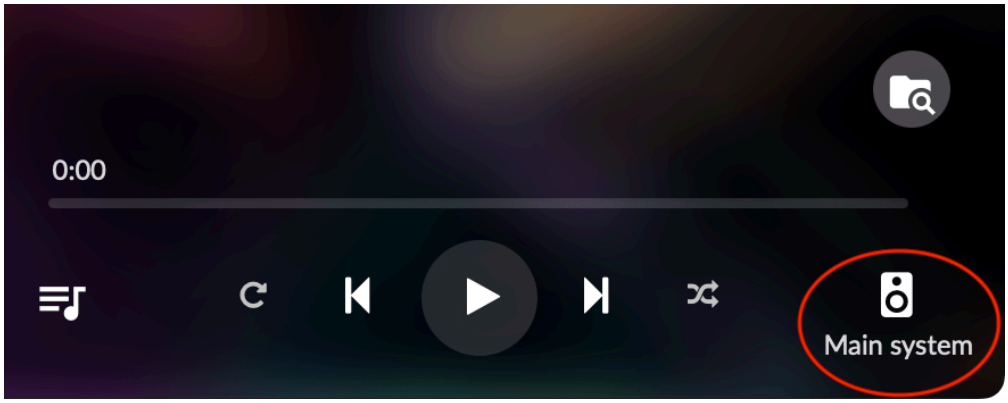


Multiroom synchronized playback

Volumio can play synchronized audio back through multiple devices, with some exceptions as shown in the table in the next section.

We will refer to the device that you use to control playback as the primary device, and the other devices as secondary devices. The primary device will be the one that you have used to connect your NAS, logged into your Qobuz or Tidal account, and so on.

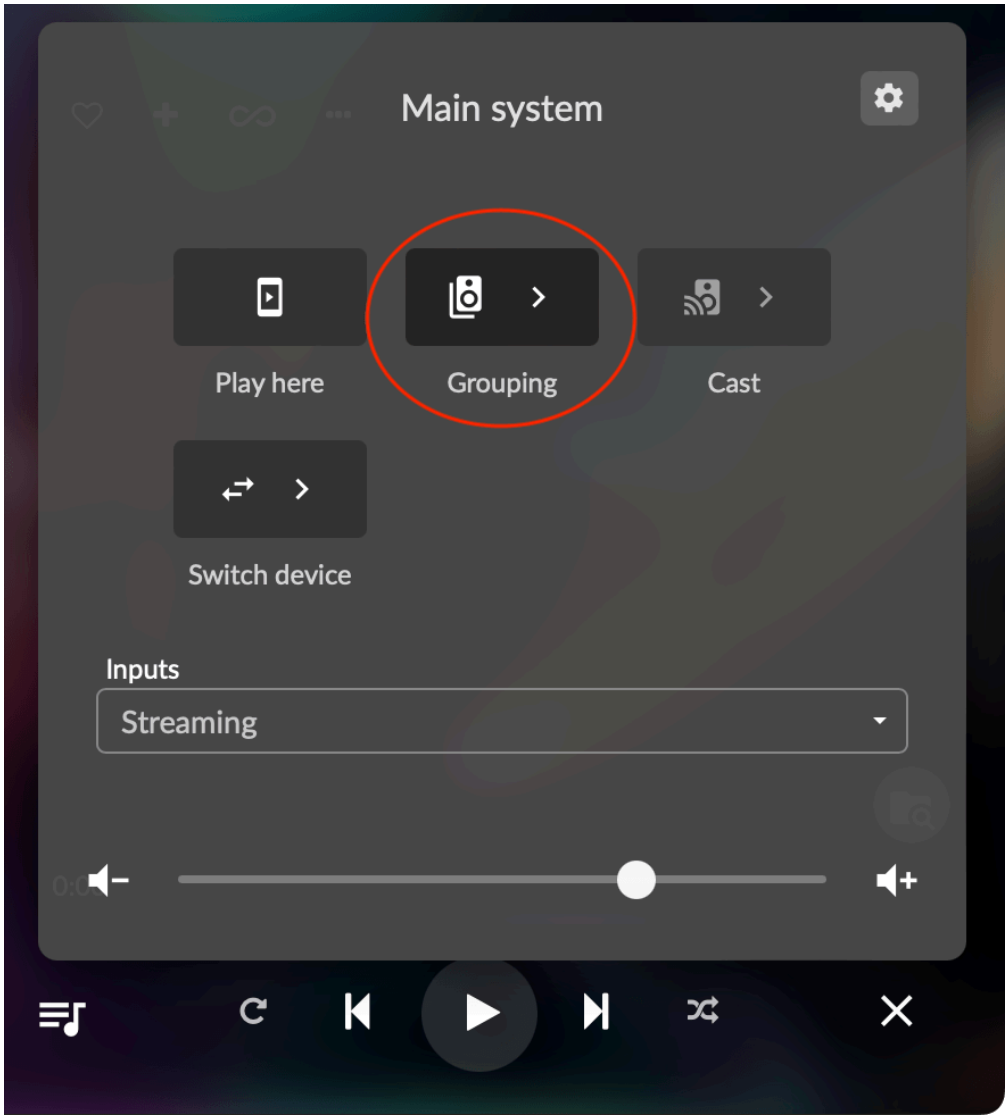
To get started, first check you are controlling the primary device:



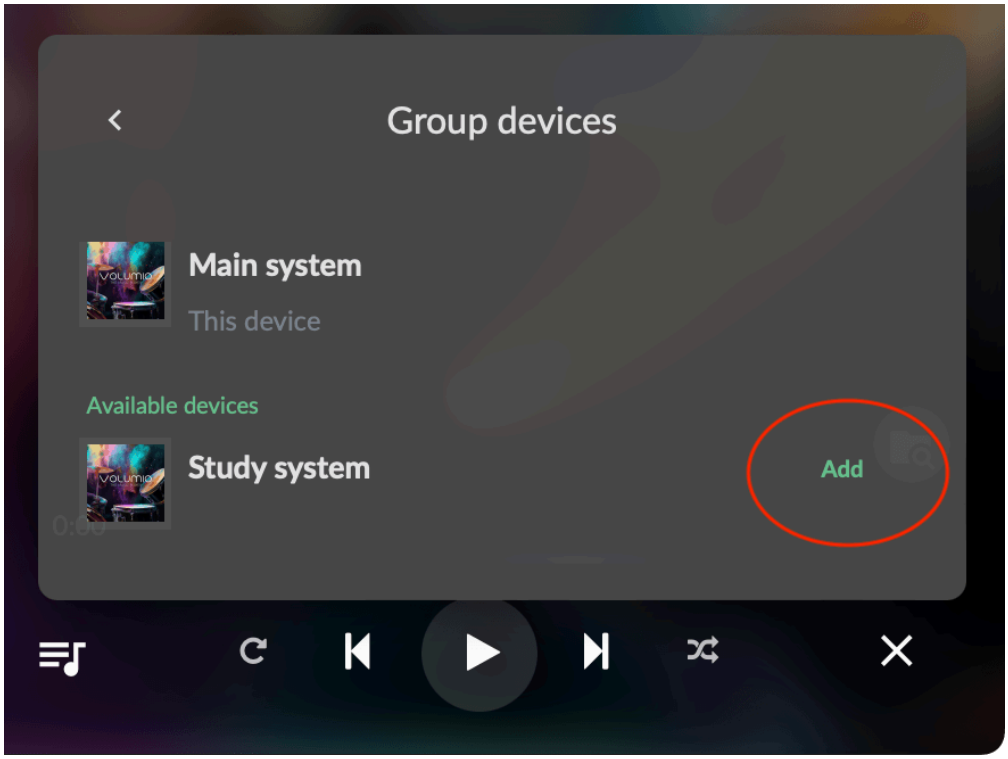
Confirm that multiroom playback is enabled in My Music → Functionalities Control:

Switch to the secondary device and confirm that multiroom playback is enabled on that device. *Then switch back to the primary device*.

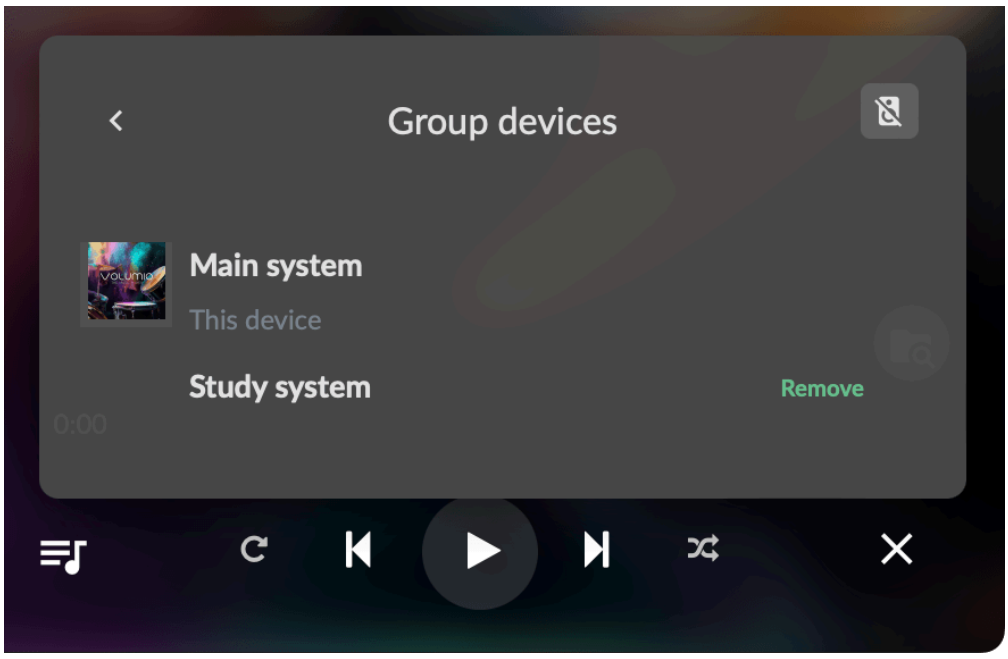
Click on the name of the primary device and select **Grouping**:



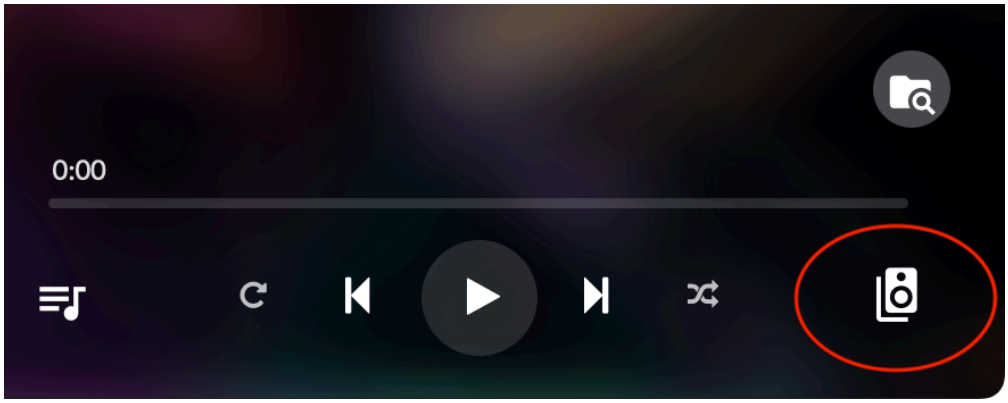
Add the secondary device (or devices) by clicking on the **Add** button:



The display will change to reflect the group:



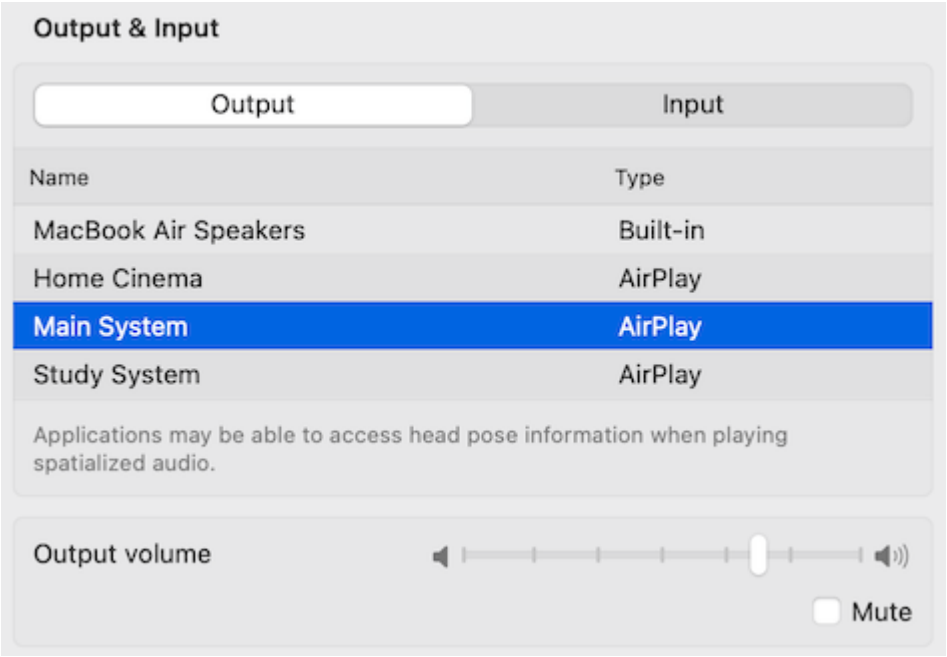
Close the pane and you will see the icon change to indicate multiple devices:



Now, any audio playback initiated on the primary device will also play on the secondary device.

Multiroom playback cheat sheet

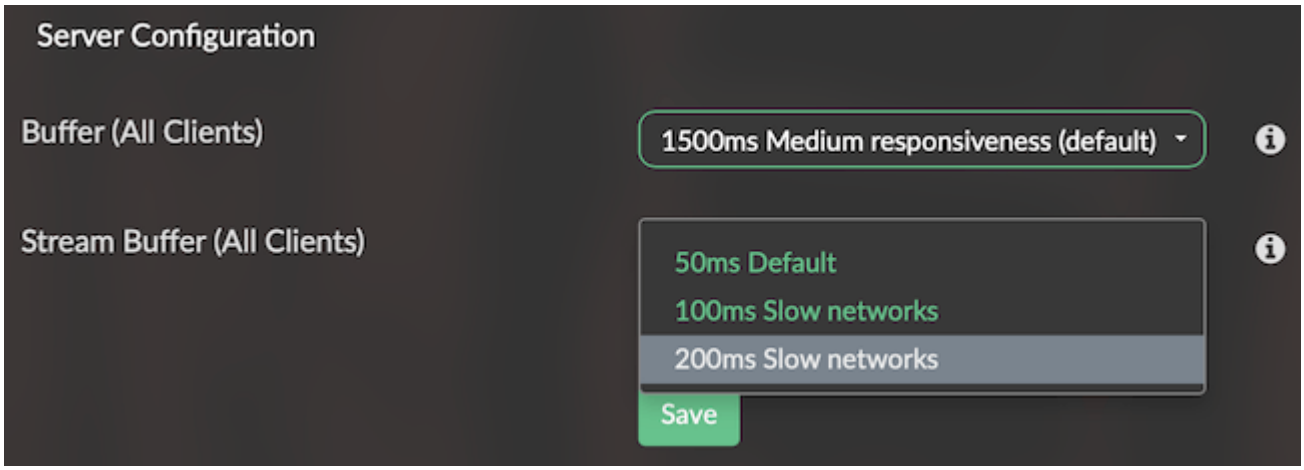
Volumio can play synchronized audio back through multiple devices, with some exceptions as shown in this table:

Item	Multi-room synchronized playback
File playback	Yes. For any playback of files initiated from within the Volumio web interface of the primary device.
Qobuz	Yes, when initiated from within the Volumio web interface of the primary device.
TIDAL	Yes. when initiated from within the Volumio web interface of the primary device.
TIDAL connect	Yes. In the TIDAL app, only the primary unit will appear. This may take a minute or two.
Spotify	Yes. The Spotify plugin must be installed on the primary device. Initiate playback in the Volumio web interface of the primary device.
Spotify connect	Yes. The Spotify plugin must be installed on the primary device. Select the primary device in the Spotify app.
Roon	No. Ungroup the devices in Volumio, and instead use the grouping feature in Roon.
Airplay	Yes. Select the primary device for output in System Settings → Sound. 

Multiroom playback settings

From My Music → Functionalities Control, scroll down to Multiroom Playback and click on the **Settings** button.

If you experience issues such as dropouts with multiroom playback, try increasing the buffer settings:



Roon

Overview

The miniDSP SHD is a certified Roon Ready player. You will need a current Roon subscription to use Roon with your SHD.

> **Tip**
>
> Roon has a free trial period for new customers. Once you have your SHD up and running, give Roon a try. You can get started from the Roon pricing page (https://roon.app/en/pricing) .

About Roon

Roon is an incredibly rich and engaging way to browse and organize your music. It runs on most Mac, Windows, and Linux PCs, or on other products which include Roon Core.

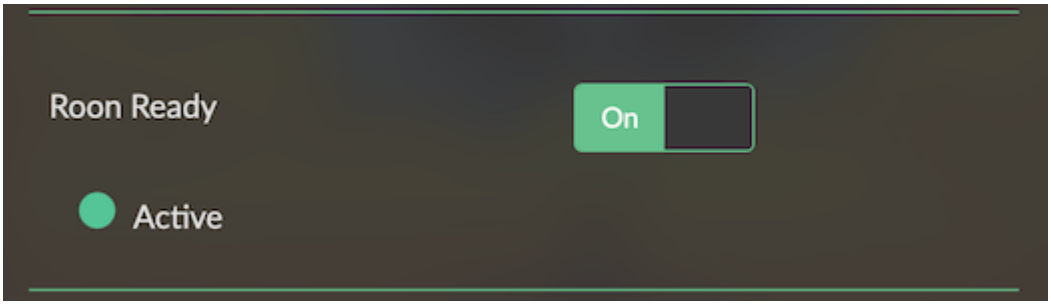
Being *Roon Ready* means that miniDSP network players transparently discover and connect to Roon without any configuration, and bit-perfect audio is delivered from Roon to your network player.

Together, Roon and miniDSP deliver the power, flexibility, and performance of networked audio, with the easiest setup and highest reliability available.

Learn more about Roon partner programs (https://help.roonlabs.com/portal/en/kb/articles/roon-partner-programs) .

Enabling Roon

Before starting, check that Roon Ready is enabled on your SHD. Open the Volumio web interface and navigate to the My Music settings page. Scroll down and confirm that Roon Ready is active:



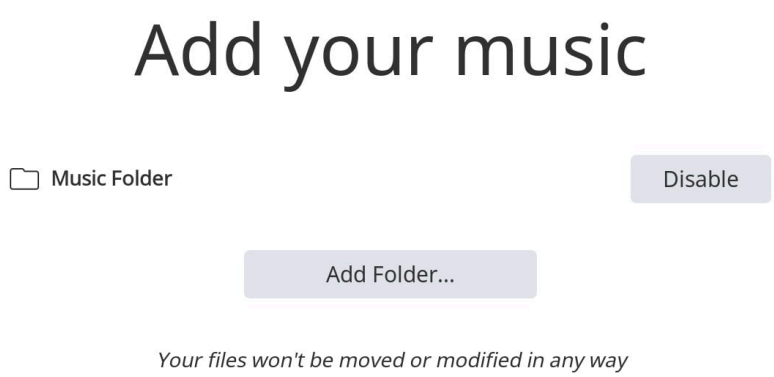
Setting up Roon on your PC

If you are already a Roon user, you can skip this section. Otherwise, this is a quick guide; refer to the Roon knowledge base (https://help.roonlabs.com/portal/en/kb/roon-labs-llc/getting-started) for detailed instructions.

> **Info**
>
> The music library that you set up in Roon is completely independent of the music files that you might have set up in the Volumio web interface. When using Roon, Volumio is purely an *endpoint* – it plays files sent to it from the Roon server, but does not manage them in any way.

There are various ways of setting up Roon. The simplest method is to install it on a computer that also has your music files on an internal or attached drive. After downloading Roon (https://roonlabs.com/downloads.html) for Mac or Windows, run the installer program. You will need to log in to your Roon account.

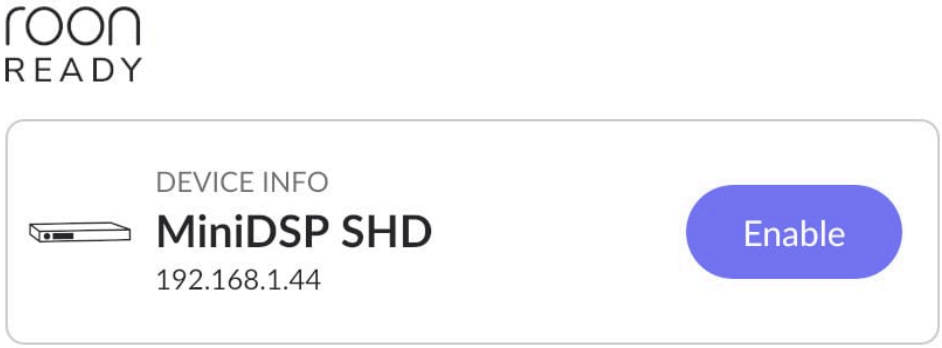
On the setup screen, click on "Add Folder...":



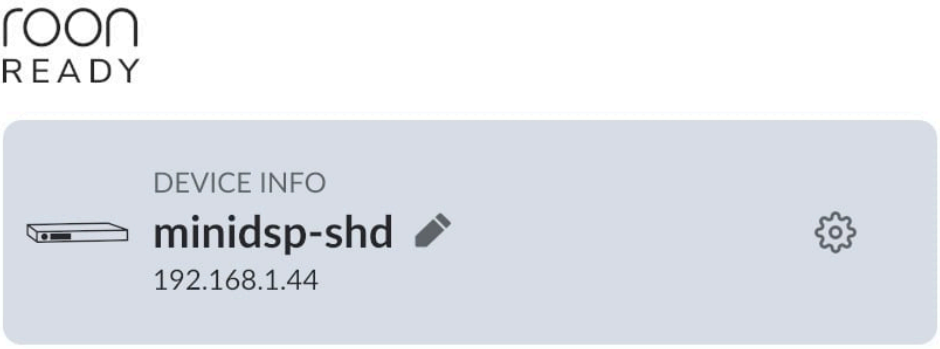
Navigate to your music library folder and select it. You can change or add folders later on by using the Settings screen in the Roon UI.

Enable the miniDSP processor

Each audio device needs to be enabled in Roon. In the Roon Settings → Audio page, locate the miniDSP SHD in the Roon Ready category:

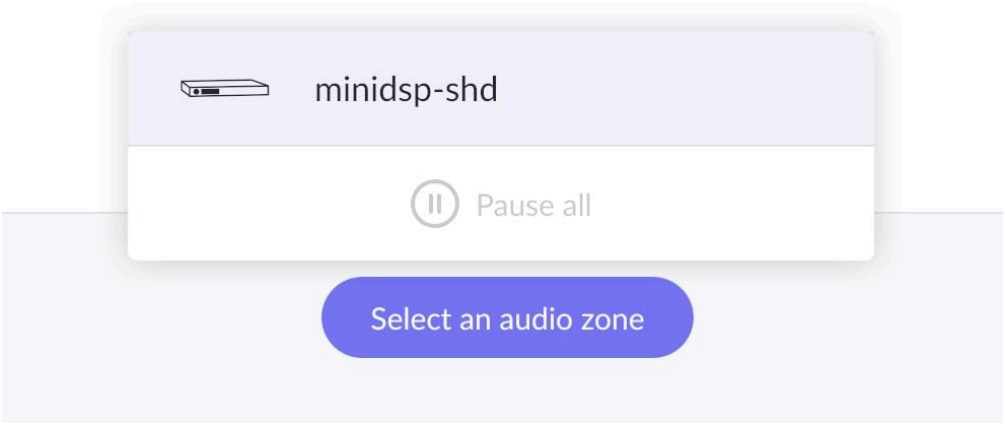


Click on its Enable button. The display will change to show the default name:

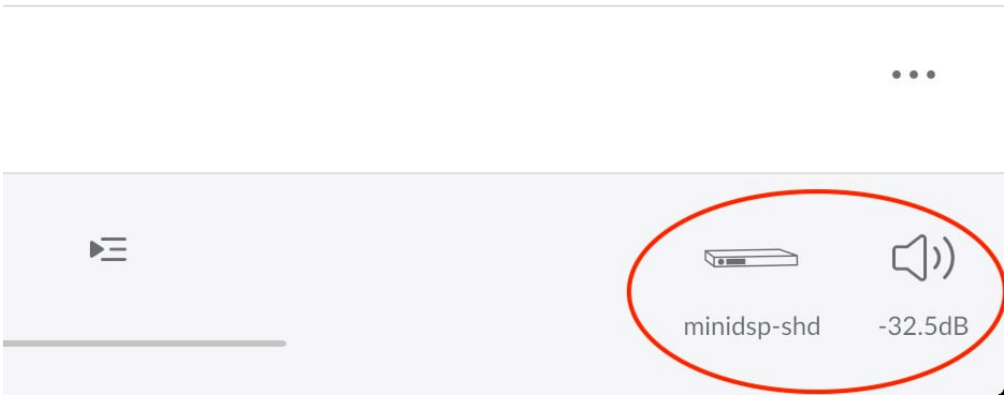


Click on the pencil icon to change the name, or on the gear icon to configure other settings.

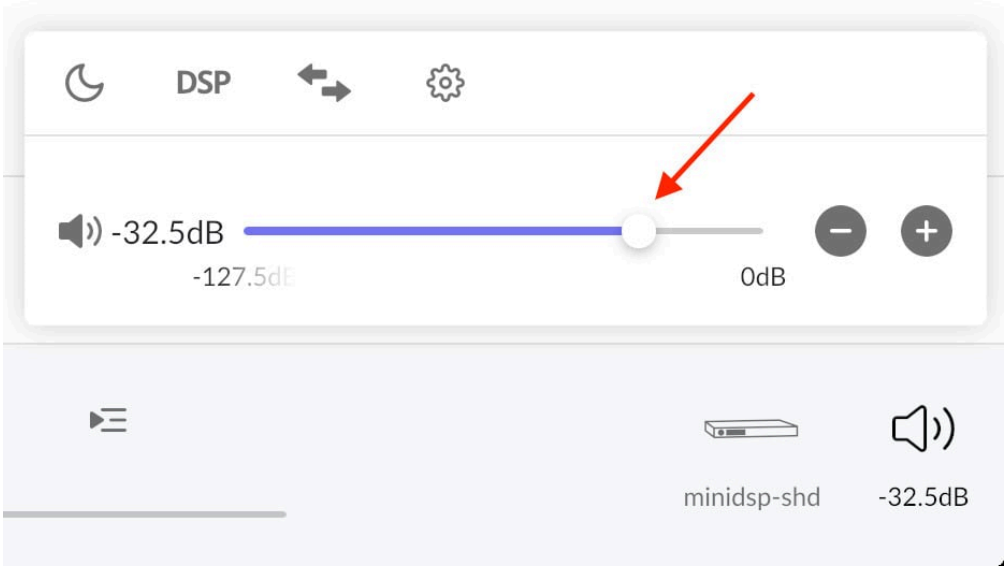
Return to the main screen in the Roon UI. Click on "Select an audio zone" and select the SHD:



Alternatively, if another device is already selected, click on its icon at the lower right and then select your SHD. In either case, the SHD icon and name will appear at the bottom right of the window, together with the current volume setting. (The icon may vary from the screenshots depending on your specific processor model.)



Click on the speaker icon to change the volume or other settings. The displayed volume is the same as displayed on the front panel OLED of the SHD:



Go to the Browse section in the Roon UI, navigate to an album, and click on "Play now":

For additional resources on how to use Roon, refer to the Roon Labs Knowledge Base (https://help.roonlabs.com/portal/en/kb/roon-labs-llc) and the Roon Community Forum (https://community.roonlabs.com/) .

Remote control of Roon playback

Use the miniDSP infrared remote to pause and resume playback, and to skip forward and backward in the playlist.

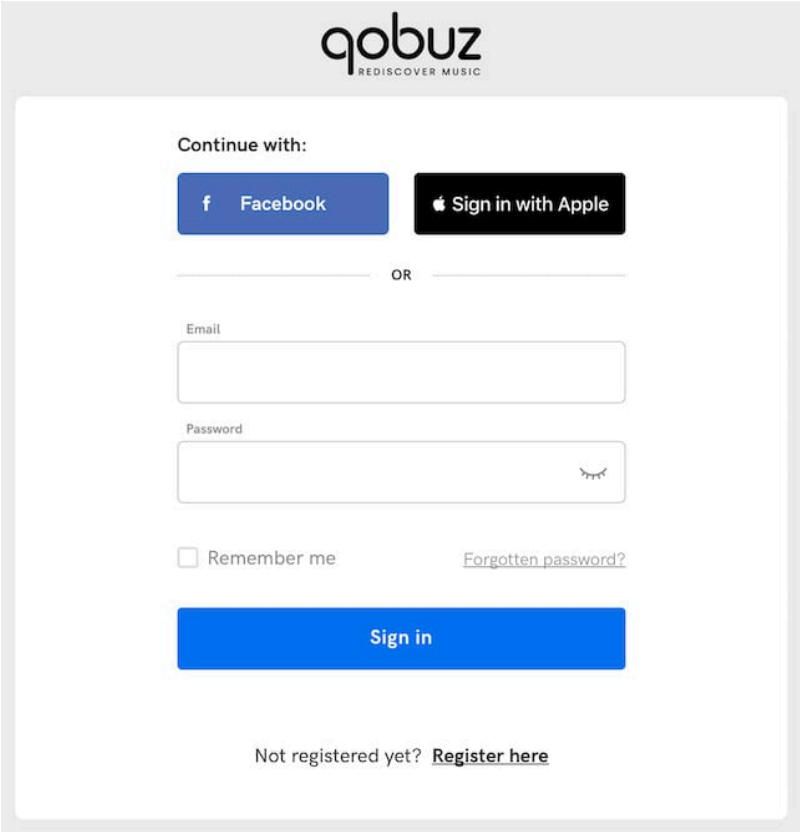
For full remote control using a mobile device, install Roon Remote on Android (https://play.google.com/store/apps/details?id=com.roon.mobile&hl=en) and iOS (https://apps.apple.com/app/id1014764083) phones and tablets.

Qobuz

Qobuz is a streaming service for lossless CD-quality and high-resolution audio up to 192 kHz. It is currently available in 24 countries. For up-to-date information on availability, see the Qobuz article Where is Qobuz available? (https://help.qobuz.com/en/articles/10128-where-is-qobuz-available)

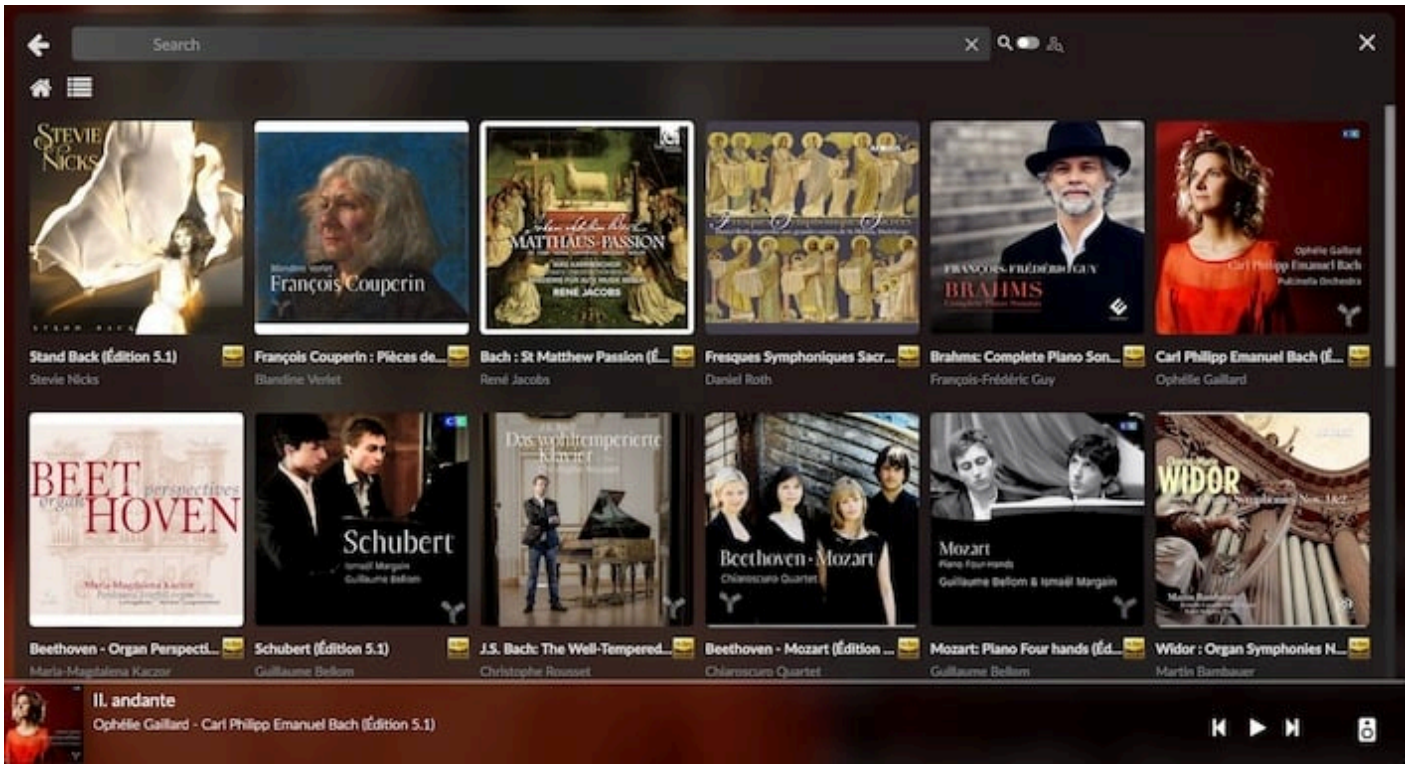
Note that Qobuz is a paid service, and you will need to have a subscription account with Qobuz to use it with the miniDSP SHD.

To enable Qobuz, go to the **My Music** heading and scroll down to **Qobuz**. Click on **Connect**. You will be directed to the Qobuz website where you can log in:



After logging in, you will be directed back to the Volumio web interface of your SHD. If you navigate to the Home screen, you will see the Qobuz logo:

Click on it to browse Qobuz and select music to play:



Tidal

Overview

TIDAL is a streaming service for lossless CD-quality audio. It is available in dozens of countries. For up-to-date information on availability, see the Tidal article About TIDAL -- Availability by Country (https://support.tidal.com/hc/en-us/articles/202453191-TIDAL-Where-We-re-Available) .

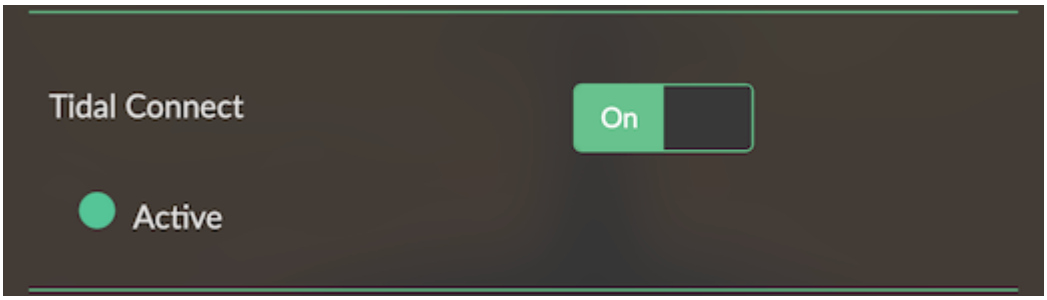
Note that TIDAL is a paid service, and you will need to have a subscription account with TIDAL to use it with the miniDSP SHD.

There are two methods of using TIDAL with the SHD: the Volumio web interface, and TIDAL Connect. You can use either or both.

TIDAL Connect

TIDAL Connect enables you to use your phone, tablet or PC to play music from TIDAL through your SHD.

Before proceeding, open the Volumio web interface and navigate to the **My Music** settings page. Scroll down and confirm that **TIdal Connect** is active.

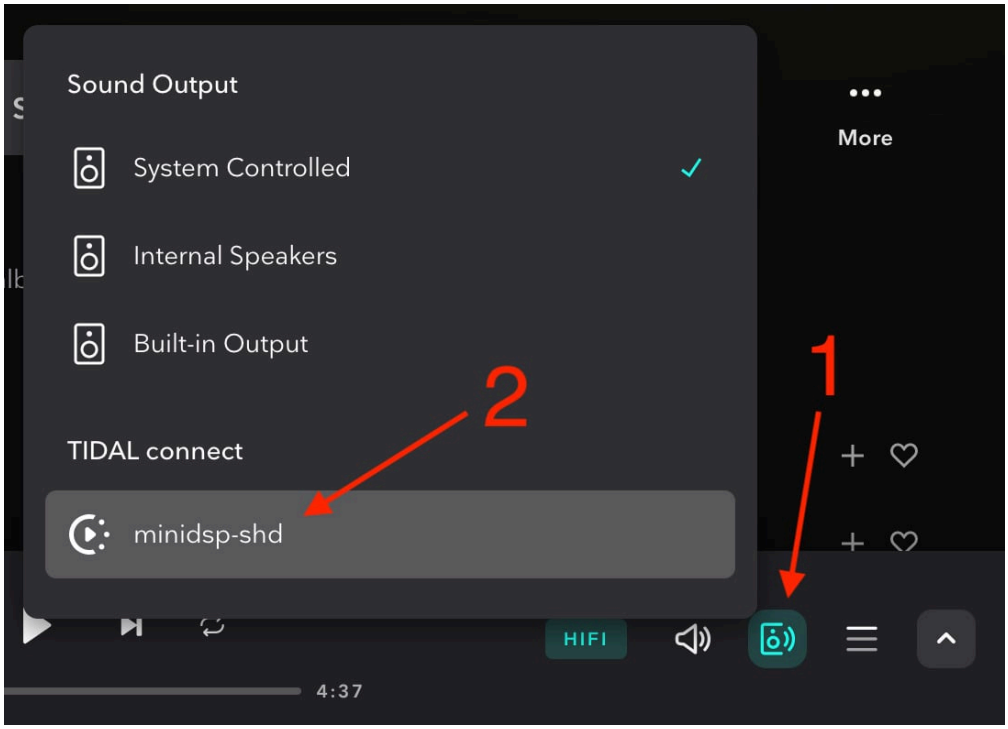


> **Tip**
>
> You do not need to log into TIDAL directly from the SHD to use TIDAL Connect. You will instead log in from your computer of mobile device running the TIDAL app.

If you have not already, install the TIDAL app onto your phone, tablet or computer. To find the download, visit this page: https://offer.tidal.com/download (https://offer.tidal.com/download) .

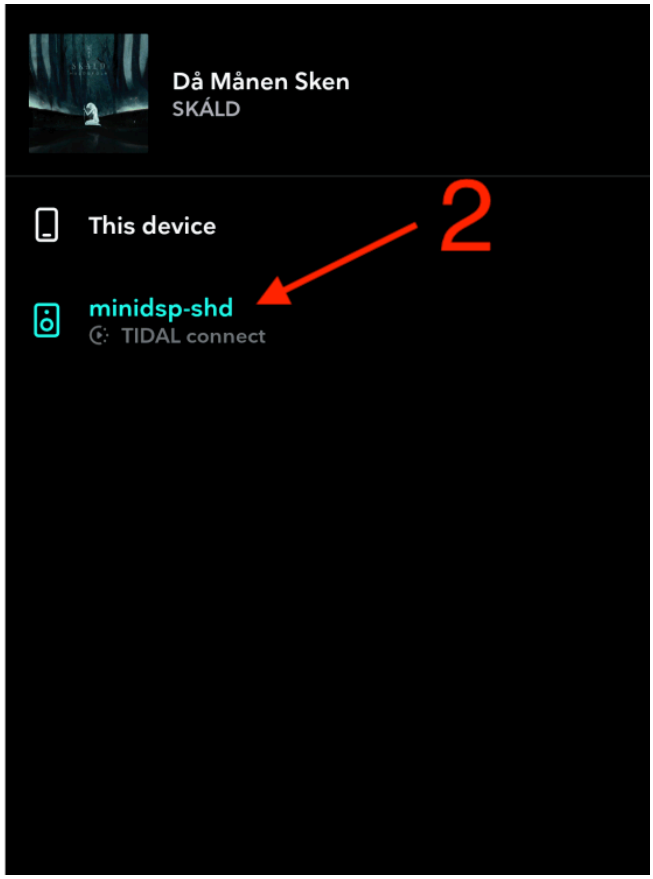
Start the app and log into your Tidal account.

To play from TIDAL to the SHD using the desktop app on your PC or Mac, click on the Connect icon towards the lower right. The list of available devices will appear. Select your SHD from the list.



> **Warning**
>
> The volume control in the TIDAL desktop app is quite small and it is easy to accidentally set the volume too high.

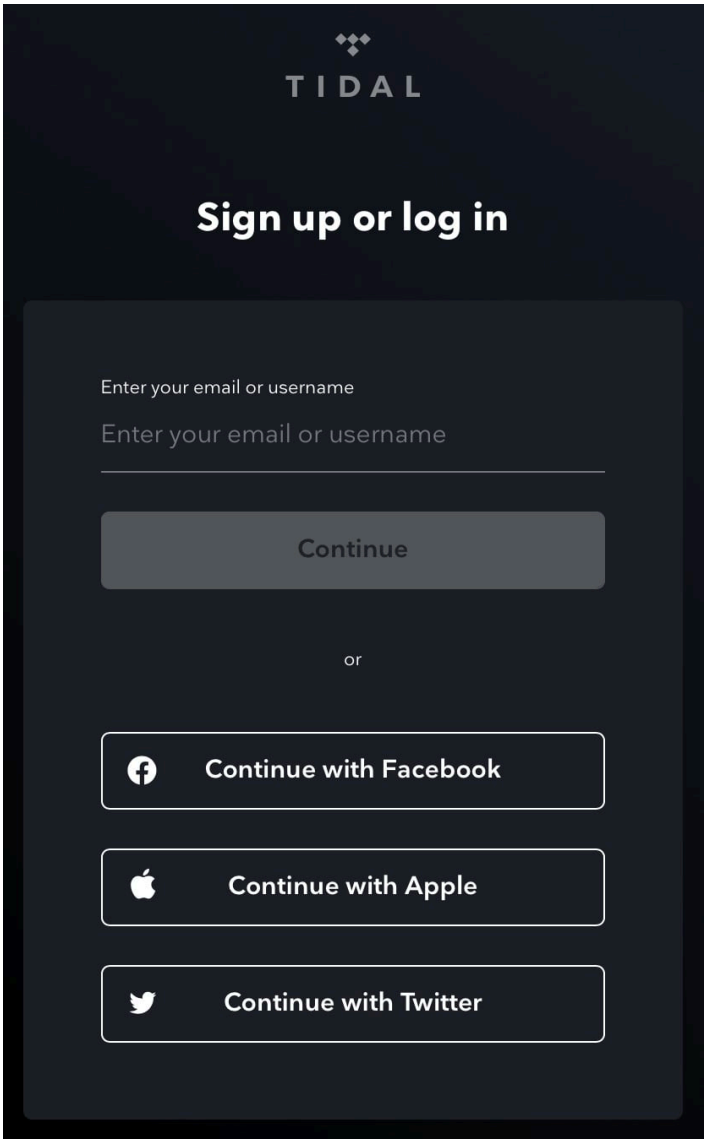
In the mobile app, go to the playing screen and click on the TIDAL connect icon at the top right, then select your SHD:



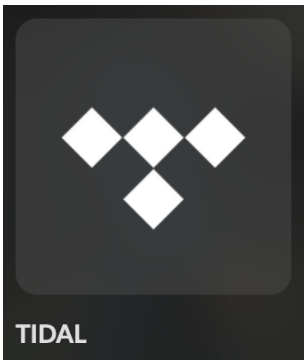
Now, any music that you select for playback through the TIDAL app will play through your SHD!

TIDAL through Volumio interface

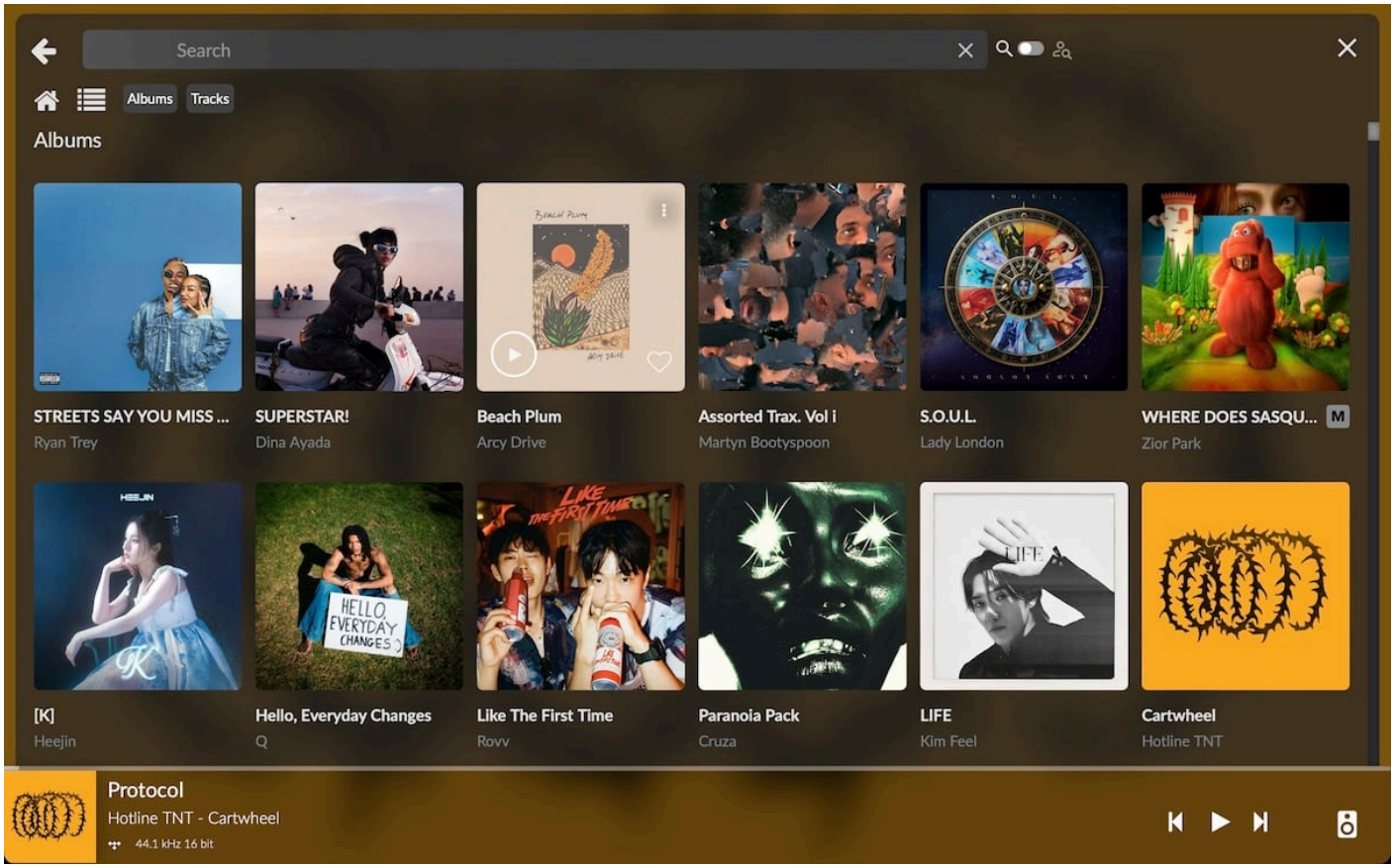
Go to the **My Music** page and scroll down to **TIDAL**. Click on **Connect**. You will be directed to the TIDAL website where you can log in:



After logging in, you will be directed back to the Volumio web interface of your SHD. Navigate to the Home screen, where you will see the TIDAL logo:



Click on it to browse TIDAL and select music to play:


Search
Albums
Tracks
Albums
STREETS SAY YOU MISS ...
Ryan Trey
SUPERSTAR!
Dina Ayada
Beach Plum
Arcy Drive
Assorted Trax. Vol i
Martyn Bootyspoon
S.O.U.L.
Lady London
WHERE DOES SASQU...
M
Zior Park
[K]
Heejin
Hello, Everyday Changes
Q
Like The First Time
Rovv
Paranoia Pack
Cruza
LIFE
Kim Feel
Cartwheel
Hotline TNT
Protocol
Hotline TNT - Cartwheel
44.1 kHz 16 bit

Spotify

Overview

Spotify is a digital music, podcast, and video service. It is available in dozens of countries around the world. For up-to-date information on availability, see the Spotify support article Where is Spotify available? (https://support.spotify.com/us/article/where-spotify-is-available/)

While Spotify does have a free tier, you will need to have a (paid) Spotify Premium account to use it with the miniDSP SHD. You will also need to create a free MyVolumio account to install the needed Volumio plugin.

There are two methods of using Spotify with the SHD: the Volumio web interface, and Spotify Connect. You can use either or both.

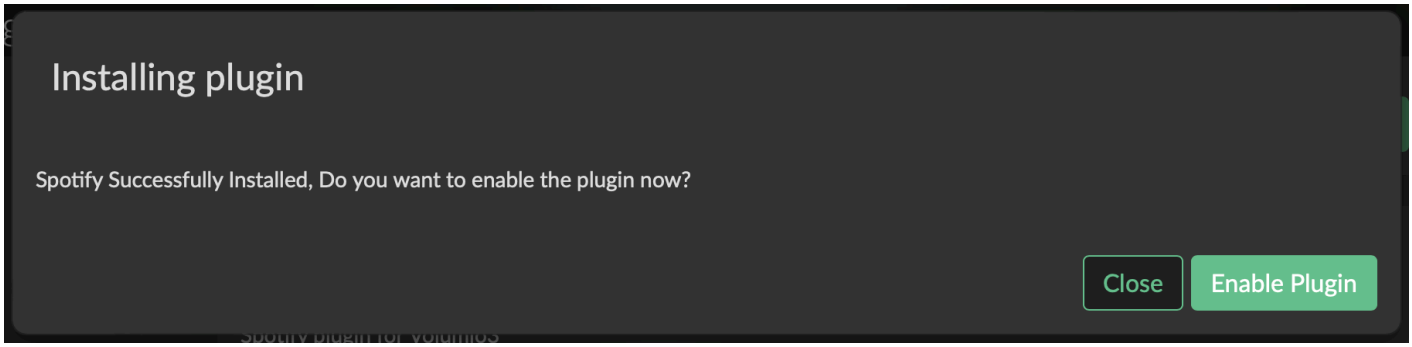
Install the Spotify plugin

Before you can use Spotify, you will need to install and enable the necessary plugin.

> **Info**
>
> Installing a plugin requires access to the Volumio Store, which requires that you log into a free MyVolumio account from your SHD. If you have not already done so, create and log into your MyVolumio account from the Main menu.

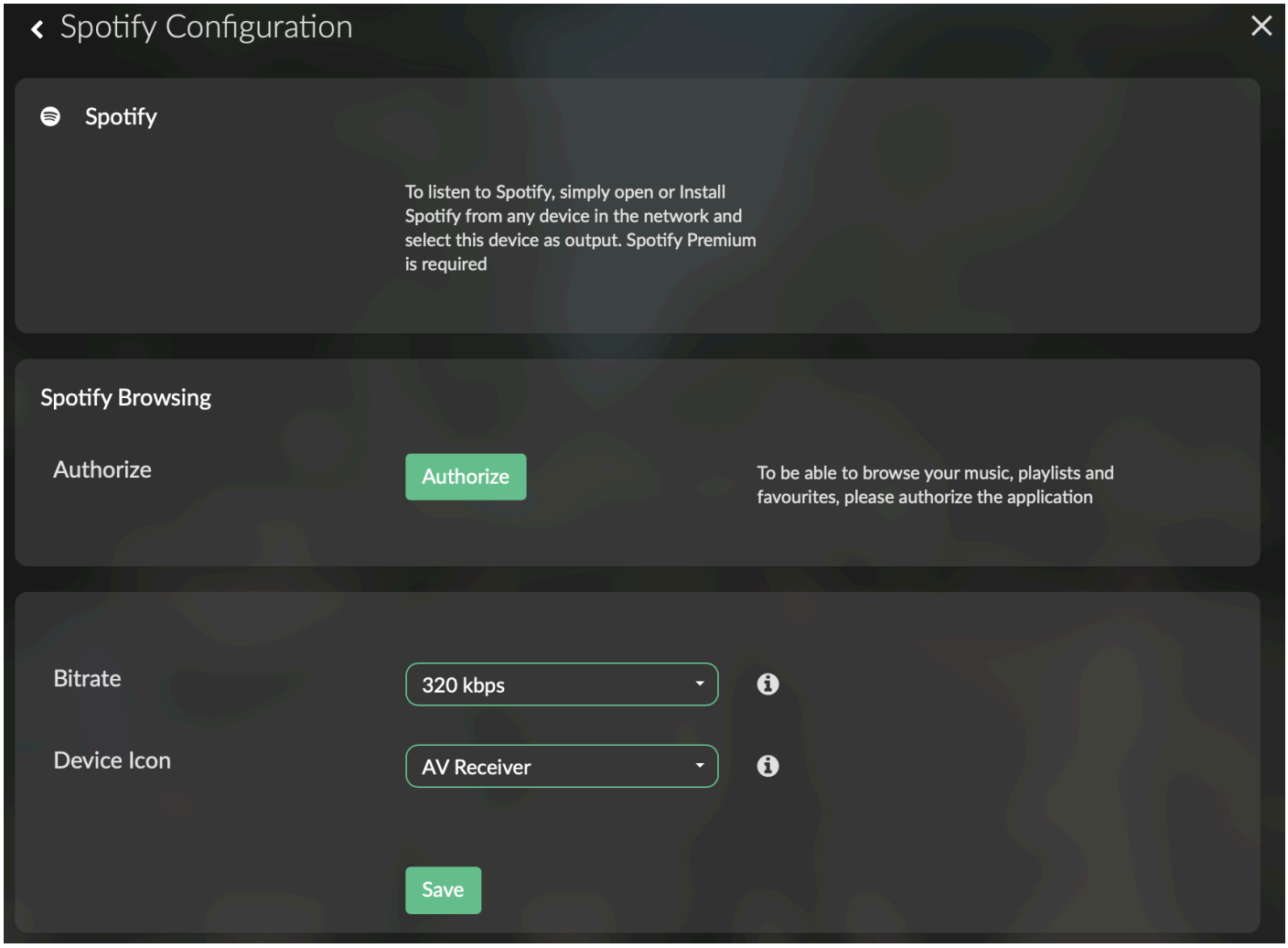
In the Volumio web interface, navigate to the **Plugins** page from the main menu. Scroll down to the **Spotify** plugin and click **Install**.

After installation completes, click **Enable Plugin**:

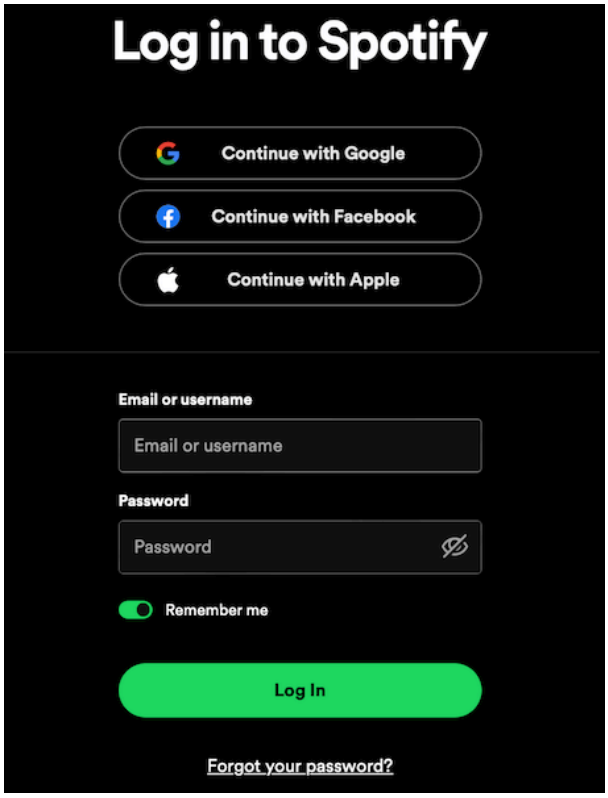


Authorize the Spotify plugin

Go to the **Plugins** page from the main menu and select the **Installed Plugins** tab. Click on **Settings** for the Spotify plugin:

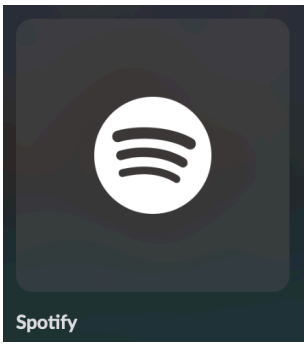


Click the **Authorize** button. You will be directed to the Spotify website where you will need to log in:

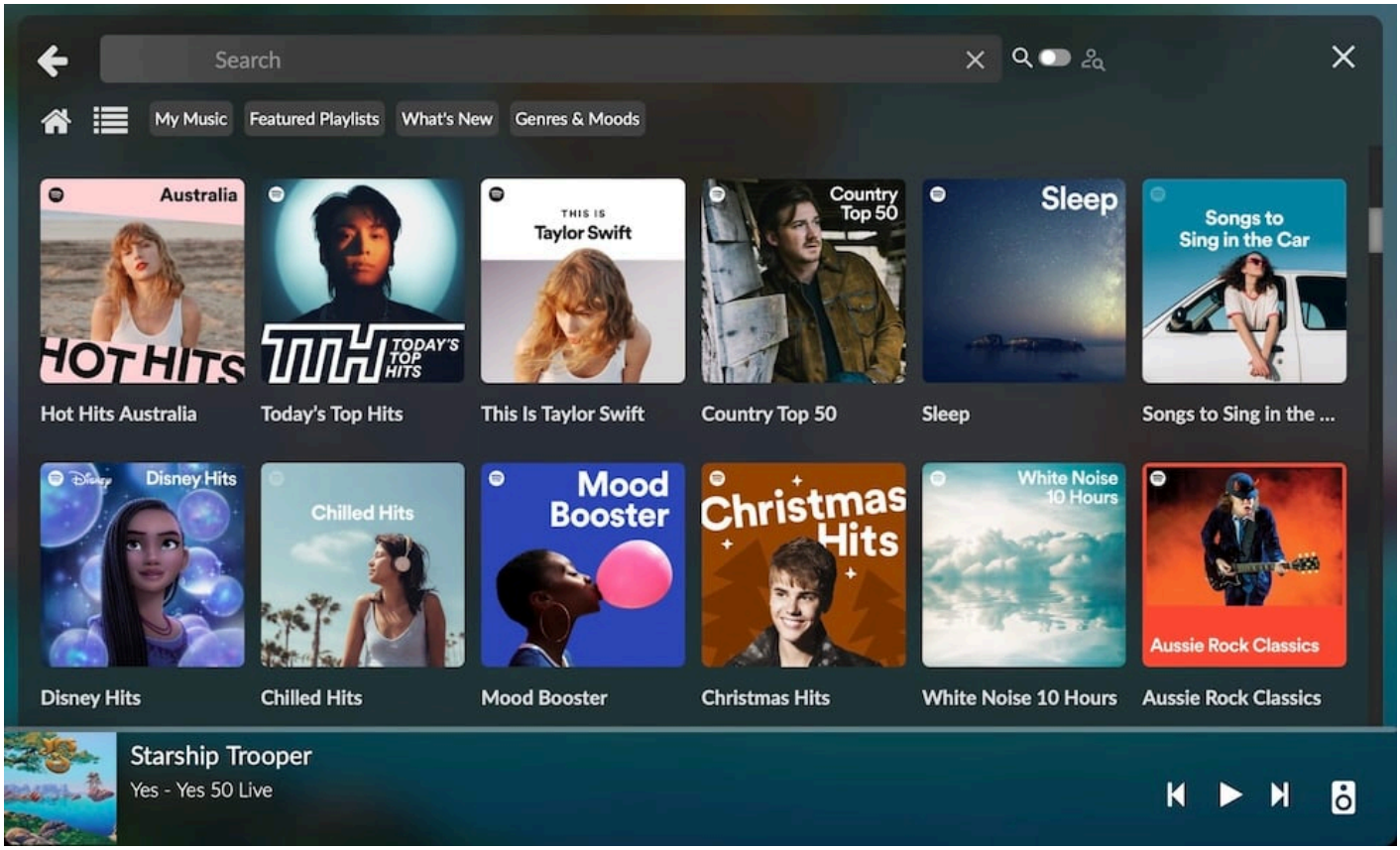


Spotify through Volumio interface

After login, the page will redirect back to the Volumio interface. Navigate to the Home screen, where you will see the Spotify logo:



Click on it to browse Spotify and select music to play:



Spotify Connect

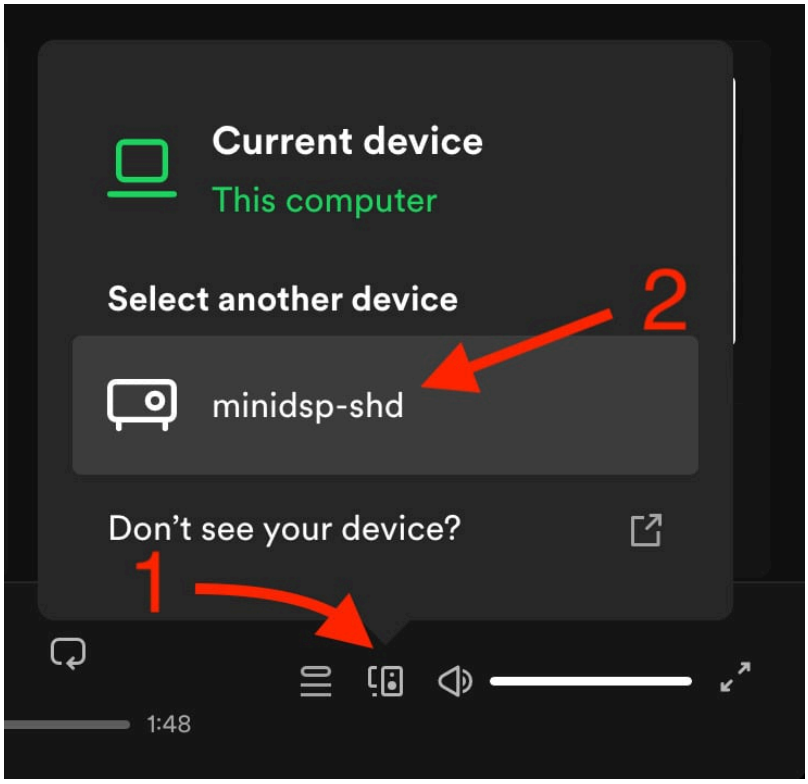
With Spotify Connect, you can use your phone, tablet or computer to control Spotify music playback through your SHD.

> **Note**
>
> Make sure that you have:
>
> 1. Enabled the Spotify plugin in the Volumio web interface, and
> 2. Authorized the Spotify plugin (i.e. sign in to Spotify), as described above.
>
> If you have not authorized the Spotify plugin, Spotify Connect will not work.

To use Spotify Connect, first install the Spotify app onto your phone, tablet or computer. To find the download, visit this page: https://www.spotify.com/download/ (https://www.spotify.com/download/) .

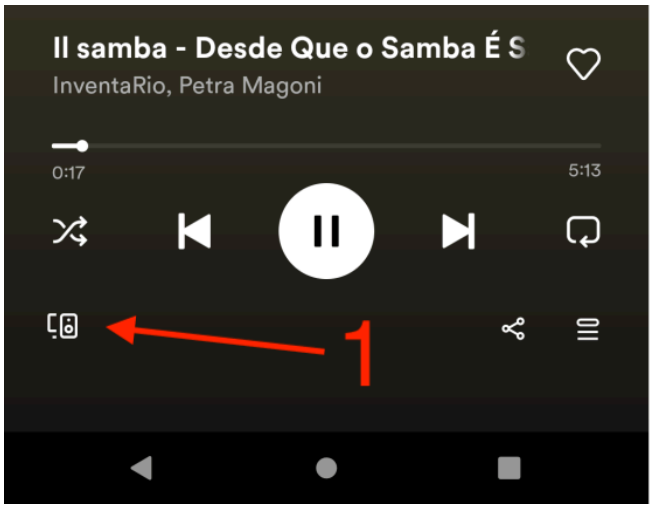
Desktop app

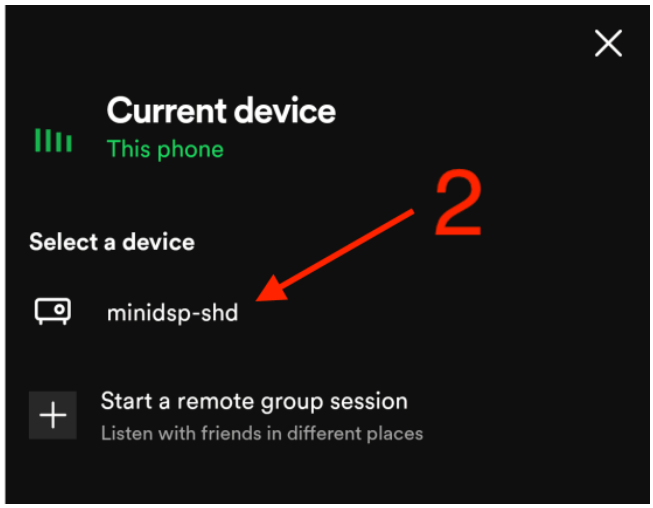
In the desktop app on your PC or Mac, click on the Connect icon towards the lower right. The list of available devices will appear. Select your SHD from the list.



Mobile app

In the mobile app, you need to play music before you select the SHD. Go to the playback control screen and click on the Spotify connect icon at the lower left, then select your SHD from the list:





After a brief delay, you should hear your Spotify music playing through your SHD!

miniDSP Device Console¶

The miniDSP Device Console ("DC") is the new configuration and control software for miniDSP audio processors. It replaces the earlier "plugin" control software. In contrast to the earlier software, Device Console provides:

- A single software program to control all miniDSP processors
- Over-the-air (OTA) self-updates
- Detection and installation of firmware upgrades for your processor

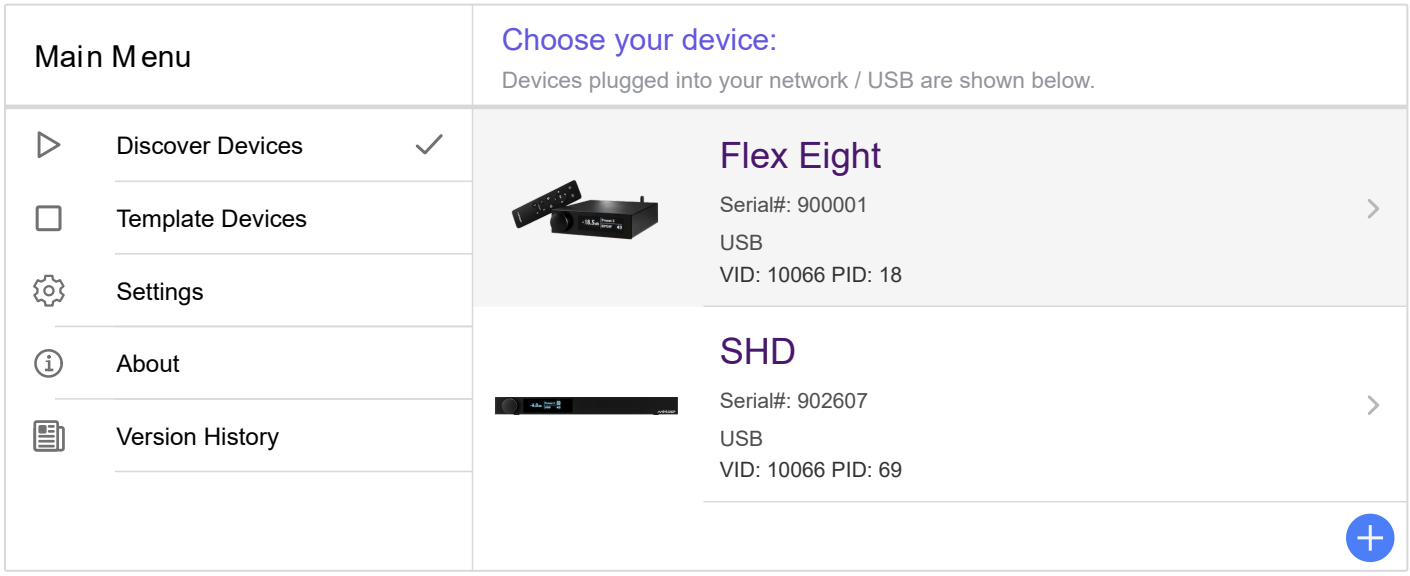
> **Note**
>
> If you have been using the old "plugin" version of the miniDSP control software with your miniDSP SHD and have not yet started using Device Console, you will need to perform a one-time migration procedure. See Migrating to DC.

> **Tip**
>
> Configuration of the miniDSP SHD with Device Console requires a USB connection. Configuration can not be done using the Ethernet connection.
>
> A Wi-DG connected to the USB port of the SHD can, however, be used to provide a Wi-Fi to USB bridge compatible with Device Console (but not with Dirac Live). See Configuration over the network and the Wi-DG User Manual (https://www.minidsp.com/images/documents/Wi-DG%20User%20Manual.pdf) (PDF).

Working with devices

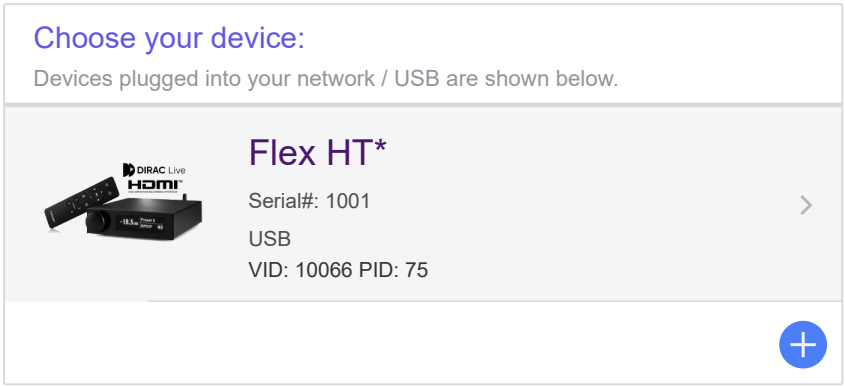
Finding connected devices

The **Discover Devices** screen displays devices connected to your computer, or which have a network-accessible control interface.



Info

If a device appears with an asterisk next to its name, such as in the example below, it means that there is a feature upgrade available for it that has not yet been installed. When you connect to it, Device Console will require that you perform an upgrade and walk you through the necessary steps.



(For more information prior to connecting and performing the upgrade, refer to the Device Console version history and the miniDSP forum announcements (https://www.minidsp.com/community/forums/announcements.2/) .)

Finding network-connected devices

The miniDSP SHD can be controlled by miniDSP Device Console over the network by using a miniDSP Wi-DG (https://www.minidsp.com/products/accessories/wi-dg) network to USB bridge.

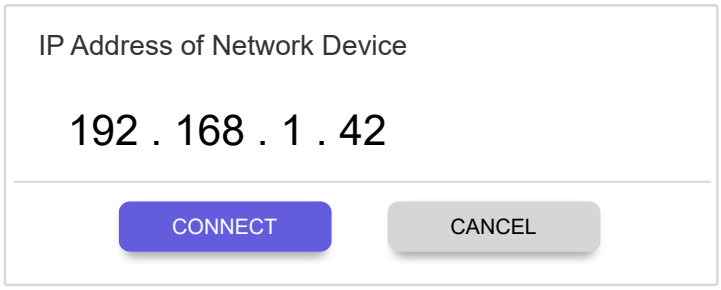
Info

Note that network control is for miniDSP Device Console only – Dirac Live calibration can **not** be performed over the network.

Note also that the network interface of the SHD is for audio streaming only, not for control. Even if an SHD is connected to the network via its Ethernet port, it will not be visible here. **It must be connected via a Wi-DG for network control with Device Console.**

If you have a Wi-DG on your network and connected to a SHD, it should appear in the list of connected devices. If not, confirm that you have updated the firmware on your Wi-DG to the latest version.

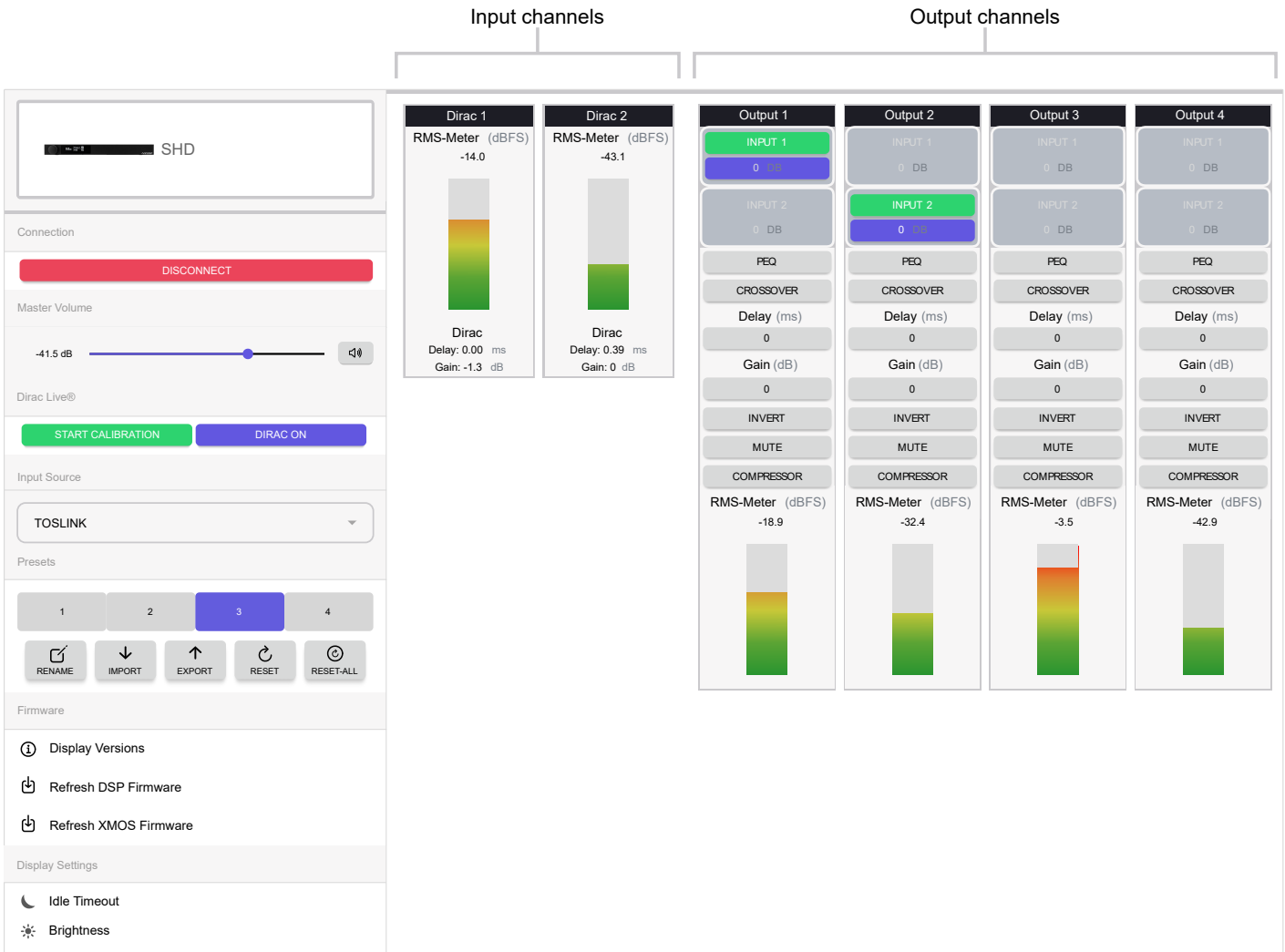
You can also connect to a device by manually entering the IP address of the Wi-DG (IPv4 only). To do so, click on the blue "+" button at the lower right of the window, enter the address and click **Connect**:



Connecting to a device

To connect to a device for editing and control, click on its name. DC will update to display the device-specific sidebar on the left and the signal processing control interface in the main area on the right.

The signal processing area is divided into sections for the input channels and output channels. There is a control strip for each channel. The output channel strips also contain the signal routing matrix.



Info

If your device has any pending upgrades, such as new firmware or features, Device Console will now prompt you to perform the upgrade. There may be several steps involved, so please be patient and follow the instructions.

Info

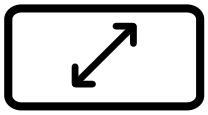
If you were previously using the older SHD "plugin" user interface and this is the first time you have used Device Console with your miniDSP SHD, Device Console will check for an existing preset that was created with the old user interface. If found, Device Console will automatically import it. This is done on a preset-by-preset basis.

Once you have switched to miniDSP Device Console, don't use the older SHD "plugin" user interface to connect to the miniDSP SHD any more.

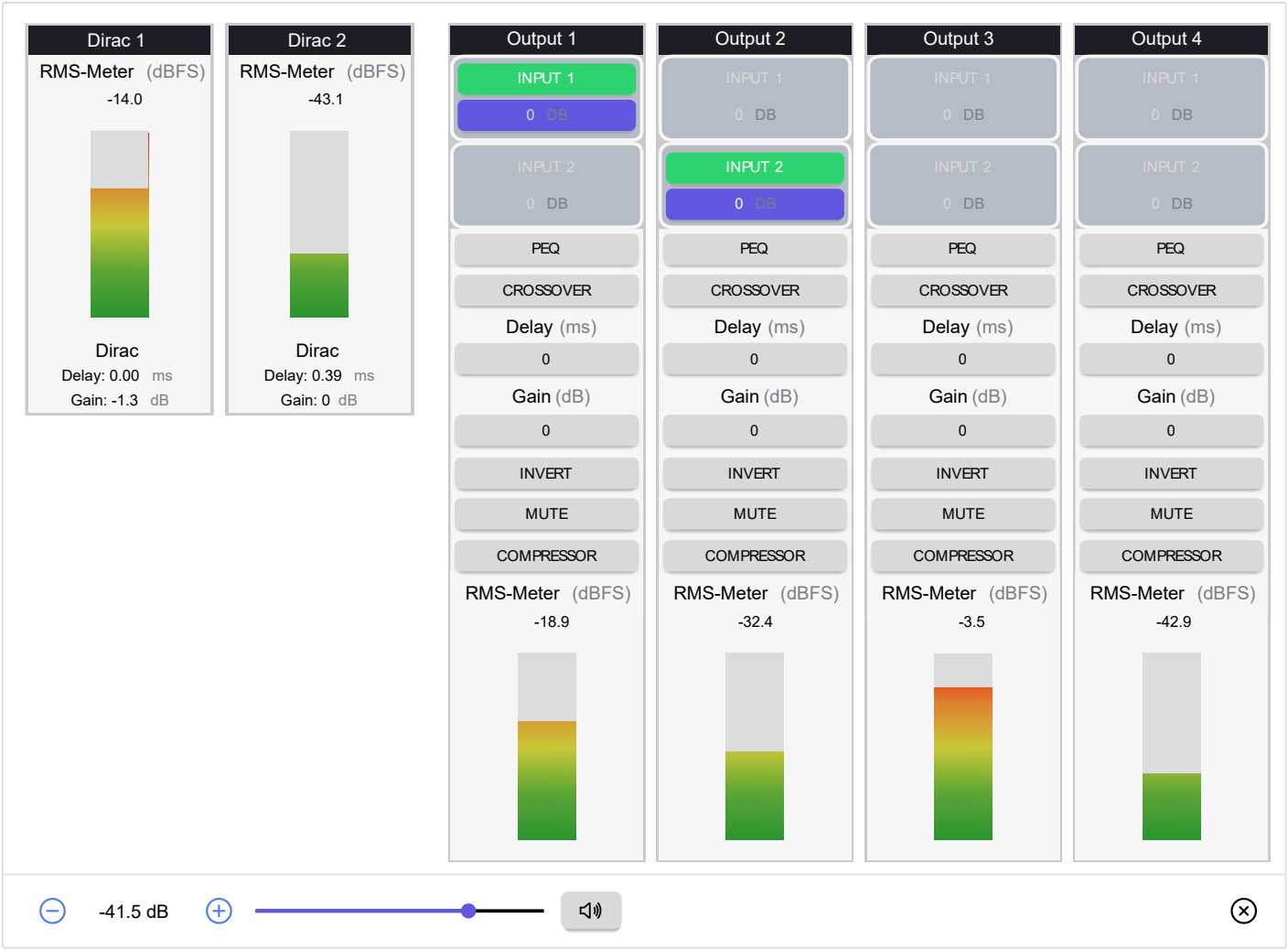
When you are done, click DISCONNECT.

Expanding the view

To hide the left sidebar and make the main signal processing controls larger, click on the Expand button at the lower right of the window:



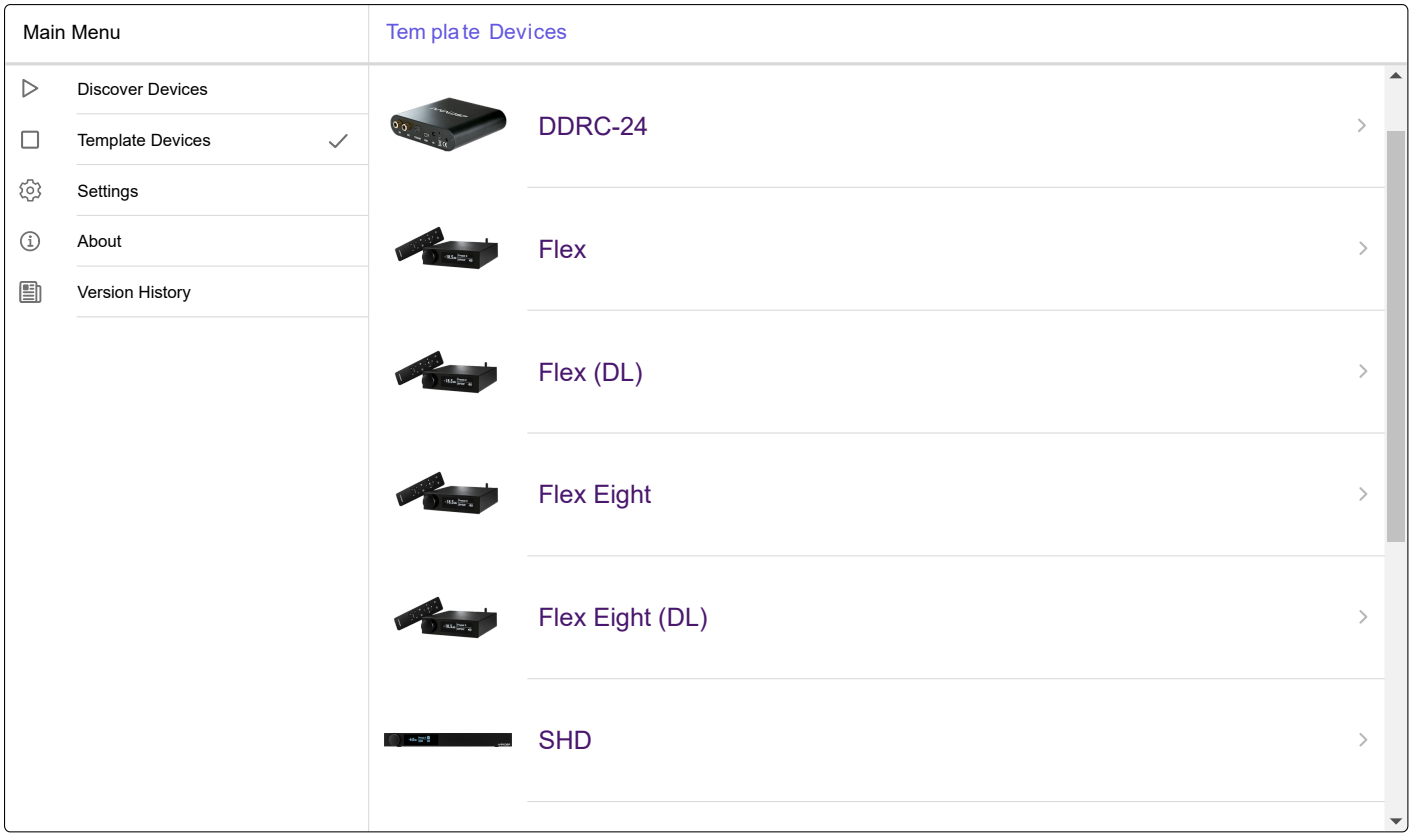
The sidebar disappears and the main controls expand to fill the available space. The master volume control is still accessible in a bar at the bottom of the window:



To restore the sidebar, click on the close button at the lower right:

Using template devices

The **Template Devices** screen displays the complete list of devices supported by Device Console. This can be used to explore features of a processor that you do not have, or to edit your processor settings when you are not able to connect to it.



Info

If a template device appears with an asterisk next to its name, it means that there is a feature upgrade available for it that has not yet been installed. When you click on it, Device Console will perform any necessary update to the template files.

To edit a template device, click on it.

A template device "mirrors" the real device, so that you can edit your settings while not connected. That is, while you are editing the real device, the current preset is copied to the corresponding template device whenever you change presets and when you disconnect. You can then edit those settings in the template device.

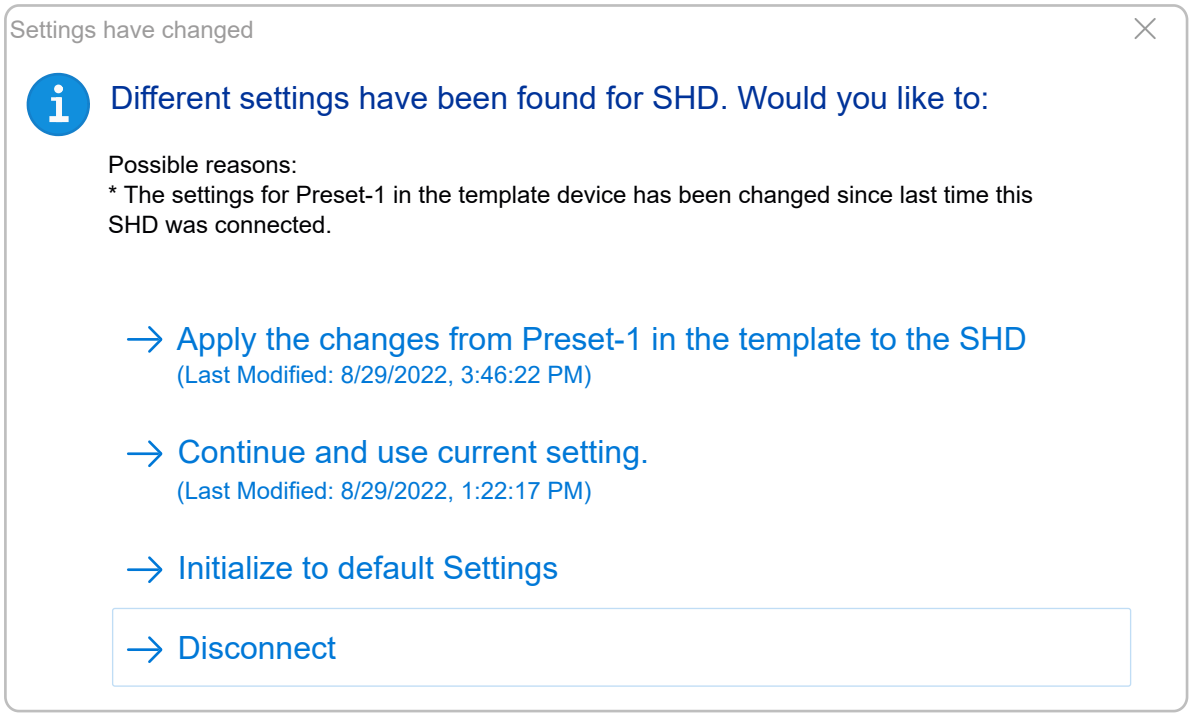
Tip

While editing a template device, the level meters will display a "dummy" signal. To turn off the level meters while editing a template device, click the Mute button in the left sidebar.

Note that not all features will be visible when editing a template device, and not all visible features will function. For example, you cannot purchase a Dirac Live upgrade in a template device, as you must be connected to the actual physical device that the upgrade is for.

When you are done editing in the template device, click FINISH.

When you connect to your real device again, Device Console detects that you have edited the template and asks you if you want to use the settings from the edited template. Or, you can discard the changes you made in the template and revert to the settings that your device had the last time you were connected to it. This is done on a preset-by-preset basis:



Info

You will see a similar dialog if you edit the settings of your device using a different computer or the older "plugin" user interface (the latter is not recommended once you have migrated to the miniDSP Device Console).

Info

If you have more than one device of the same type, only one of them can be edited using the template device. If you have more than one device of the same type or need to edit your devices from more than one computer, you will need to manage your presets by exporting them to and importing them from files. See Importing and Exporting.

Controlling a device

The following sections apply when Device Console is connected to a processor, or when editing a template device.

Volume and mute

To change the volume from within Device Console, drag or click on the slider:

The volume can also be changed in 0.5 dB increments by clicking the blue "+" and "-" buttons to the left of the slider.

To mute the SHD, press the mute button:

> **Tip**
>
> While the cursor is over the volume slider, use the mouse scroll wheel to adjust volume.

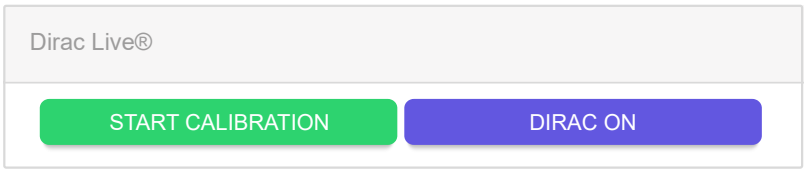
Using Dirac Live

> **Info**
>
> This section applies only if Dirac Live is activated on your SHD. If it is not, you will see an option here to purchase an upgrade instead of the **Start Calibration** and **Dirac On/Off** buttons.

> **Info**
>
> The miniDSP SHD implements **stereo** Dirac Live correction. That is, there are two channels of Dirac Live correction. After stereo Dirac Live correction, the audio signal is routed to the four output channels for processing such as parametric EQ and crossovers.

To start Dirac Live calibration, click on the START CALIBRATION button. The Device Console will disconnect and the Dirac Live application will start.

Dirac Live room correction can be turned on and off with the DIRAC ON/DIRAC OFF button. The front panel knob and the remote control can also be used to turn Dirac Live on and off.



Tip

Be sure to start the Dirac Live application from within the Device Console using the **START CALIBRATION** button. If you open the Dirac Live application directly from your operating system, it will not be able to detect the SHD.

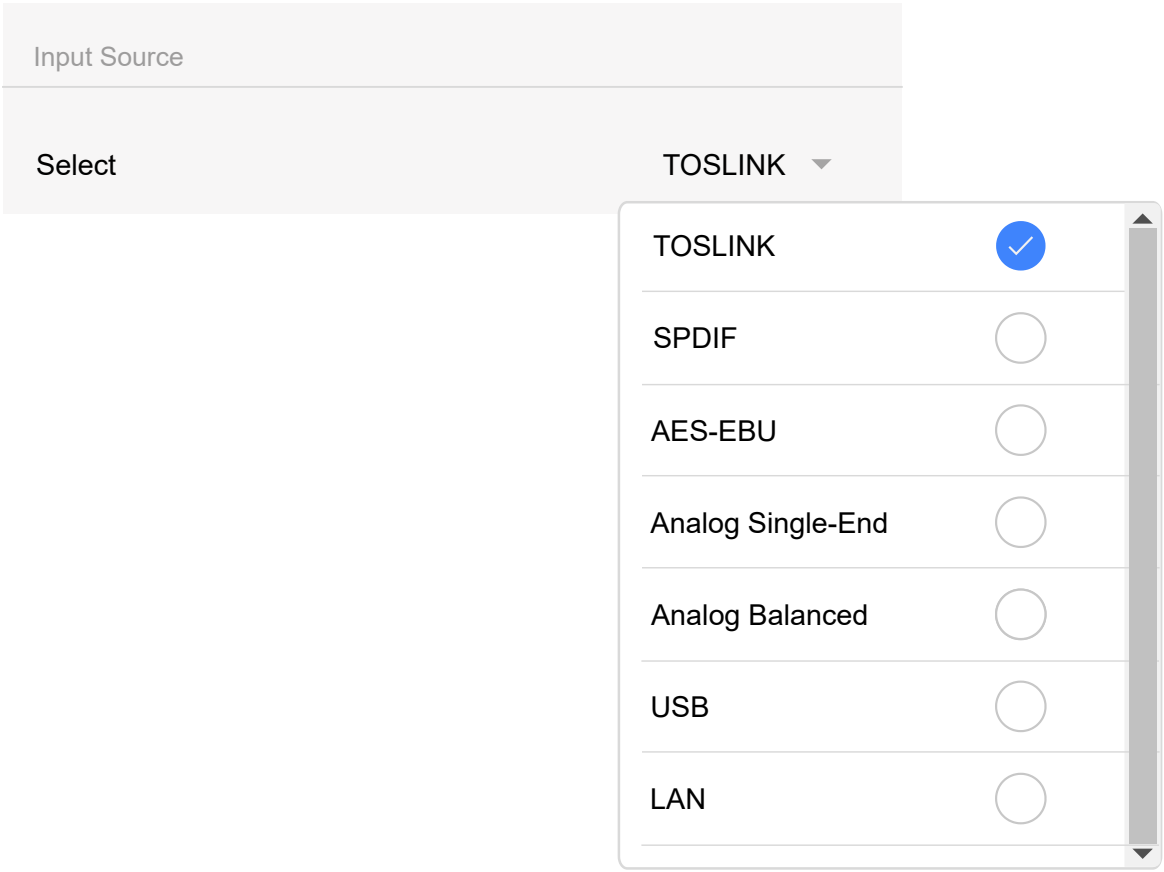
Info

Dirac Live calibration **can not** be performed over the network, so the START CALIBRATION button will be visible only if the SHD is connected to the computer by USB.

Input sources

Select input source

To select the input source, drop down the selector menu and select the desired input:

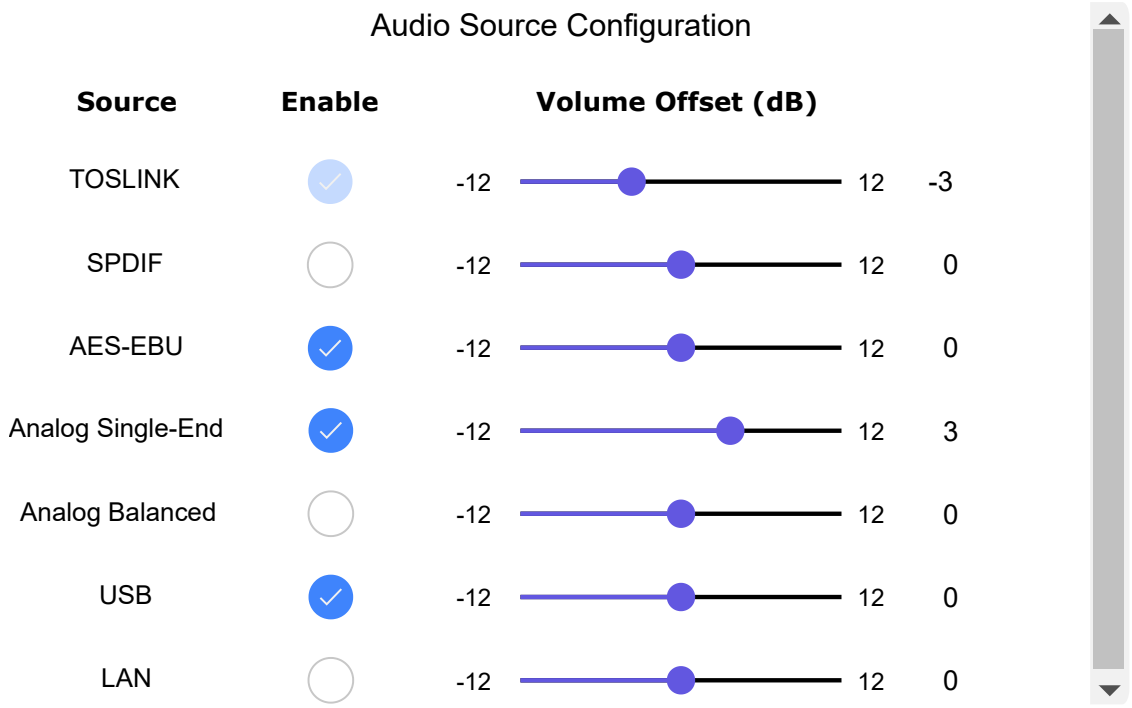


Info

The input source can also be selected from the front panel or with a remote control.

Audio source configuration

Click on the CUSTOMIZE SELECTION button to open the Audio Source Configuration window:



Enabling and disabling audio sources

Each input source can be enabled or disabled by clicking on the button in the Enable column. This is a convenience feature so that unused inputs do not have to be cycled through when using the front panel or remote control.

> **Info**
>
> The currently-selected input is greyed out and cannot be disabled.

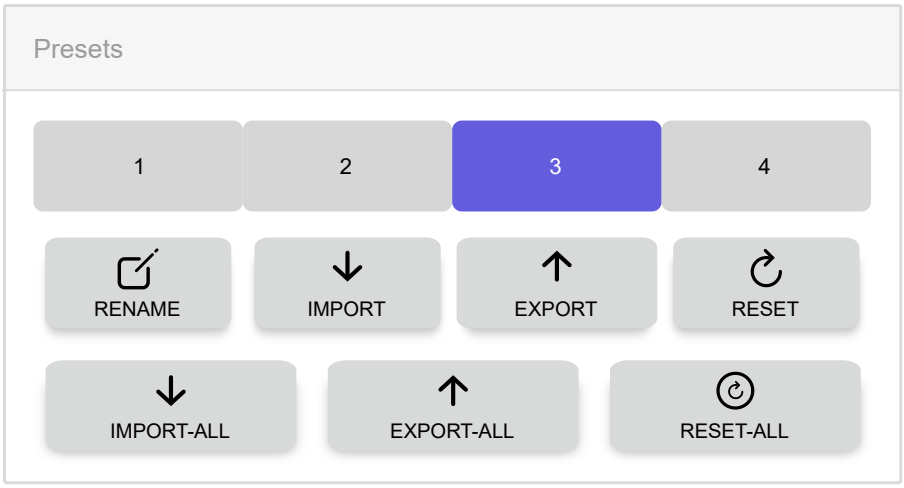
Input volume offset

Each input source also has a volume offset, ranging from -12 to +12 dB. The volume offset is applied as the very first step of digital processing in the miniDSP SHD. This feature can be used to:

- Match volume levels from different sources. For example, analog sources often have a lower average level than digital sources. Adding a positive volume offset can reduce the need to change master volume when switching sources.
- Address the phenomenon of "inter-sample peaks" on certain digital sources by reducing the digital signal level. For more information, see the page On inter-sample peaks.

Note that the volume offset is not stored in presets.

Using presets



The miniDSP SHD has four onboard presets, each of which contains all of the settings for audio processing.

> **Info**
>
> Items controlled by the front panel and remote control (volume, mute, input source, Dirac Live on/off) are not stored in the presets. Similarly, items accessed from the left sidebar, such as front panel brightness and audio source configuration, are not stored in presets.

Selecting a preset

Click on the desired preset number. Or if you have renamed the presets, its name.

When a preset is selected, two things happen in the SHD:

1. The values that you have set up for that preset using Device Console are loaded into the DSP working memory, and
2. The Dirac Live filters that you exported to the SHD are also loaded into the DSP working memory.

Renaming

To rename a preset, select it, then click the RENAME button. Enter the desired name, then click OK. The name can be up to 12 letters long.

> **Info**
>
> The preset name is displayed in the Device Console **only**. The front panel of the SHD will still display "Preset 1" through "Preset 4".

Importing and exporting

Use the buttons provided to export and import presets.

> **Tip**
>
> To copy one preset to another, export the first preset to a file, select the second present, and then import the file that you just saved.

Export a single preset

To export a single preset to a file, click the EXPORT button. Navigate to the desired location in the file system, change the file name if desired, and click **Save**.

Export all presets

To export all four presets to individual files, click the EXPORT-ALL button. Navigate to the desired location in the file system and click **Select Folder**. Any presets that are not at the default setting will be written to files named **exported-SHD-*nnnn*-preset-1** and so on (where *nnnn* is your device's serial number).

> **Note**
>
> It is not possible to load a preset *from* the SHD back to the Device Console. We therefore strongly recommend always exporting all of your presets to files when they are complete, to ensure that you don't lose them in future.

Import a single preset

To import a single preset from a file, click the IMPORT button, then navigate to a saved preset file and click **Open**. The preset will be loaded from the file. If Device Console is currently connected to the miniDSP SHD, the preset will also be sent to the SHD.

Import multiple presets

To import more than one preset in a single go, click the IMPORT-ALL button and then navigate to the folder containing the presets. Use Ctrl-click (Windows) or Cmd-click (macOS) to select up to four files, then click **Select File(s)**. A dialog box will appear that allows you to assign one of the selected files to each preset slot. After doing this, click **IMPORT**.

(Note that you can import a single preset into more than one preset slot using IMPORT-ALL.)

Resetting

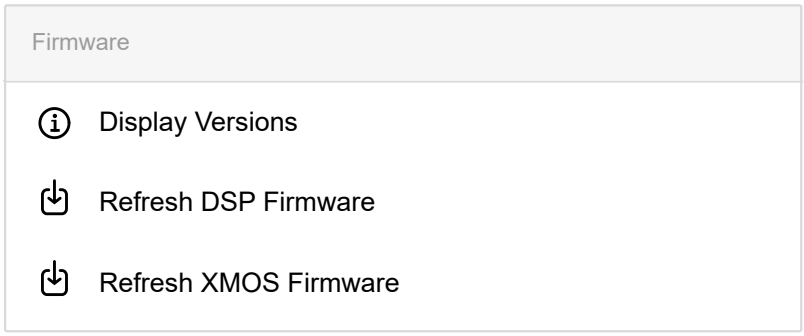
To reset the current preset to default values, click the RESET button.

To reset all four presets to default values, click the RESET-ALL button.

Configuring a device

Firmware updates

miniDSP Device Console will check for firmware updates when a device is connected, and notify you if one is available. To manually update the firmware, click the **Refresh DSP Firmware** and **Refresh XMOS Firmware** button.



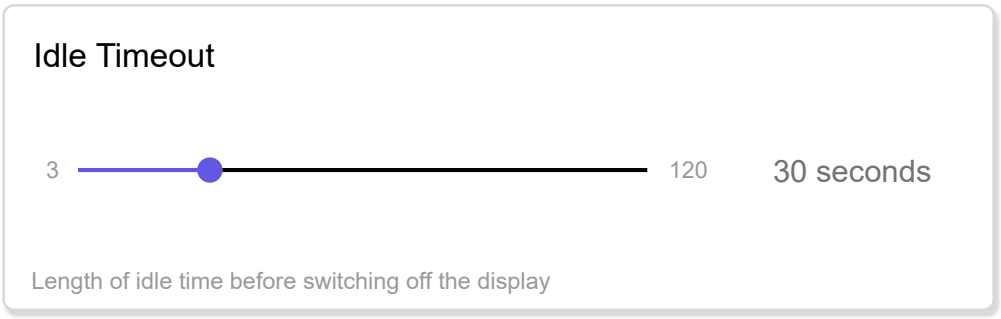
> **Tip**
>
> You do not need to use these buttons in normal operation. They are there in case your SHD has issues or miniDSP Support instructs you to refresh the firmware. They can also be used when downgrading from a beta release to the previous stable release.

Display settings

Controls to manage the front panel display are accessed from the left sidebar. Click on *Front Panel Display* to access them.

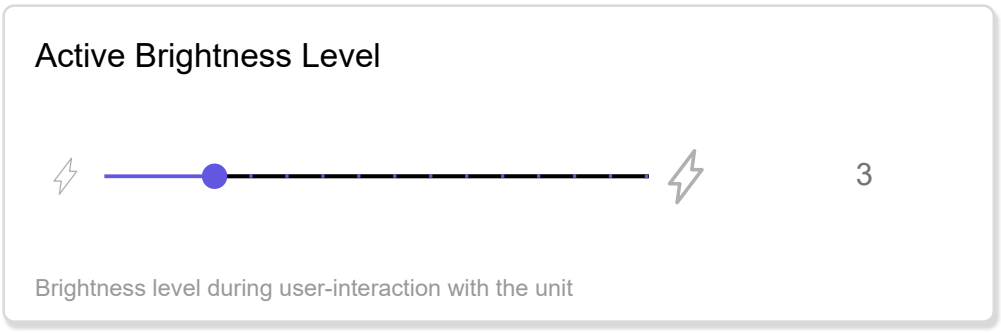
Idle Timeout

The idle timeout is the amount of time after any user interaction until the front panel turns off. It can be set to a value between 3 and 120 seconds. The display will turn on again on any user interaction.



Brightness

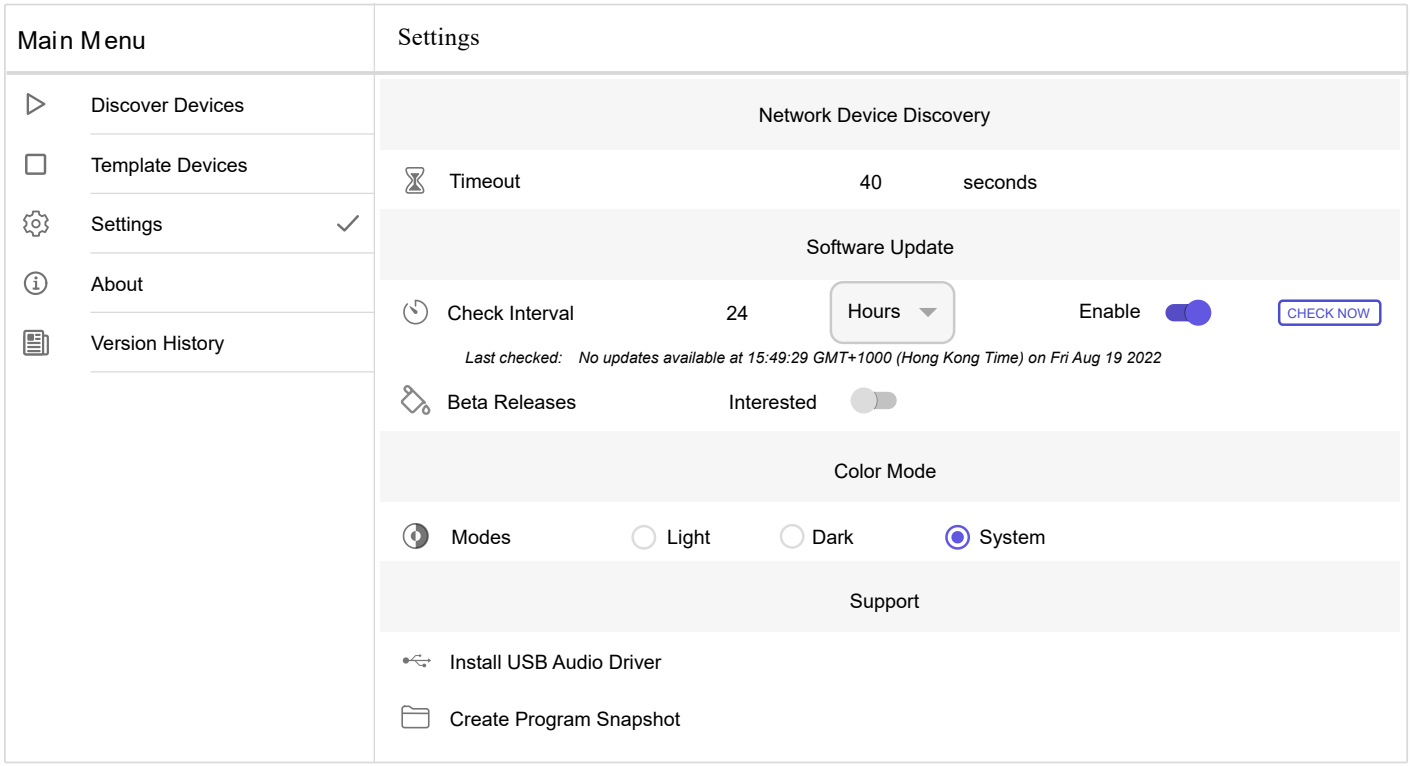
The active brightness level is the screen brightness when it is turned on. It can be set to a value between 1, the dimmest, and 8, the brightest.



> **Info**
>
> The minimum setting of "1" does not turn the display fully off, but to the minimum supported brightness level.

Settings

These settings are for Device Console itself (and not any connected processor).



Timeout is the amount of time that Device Console will scan for networked devices.

The **Check Interval** setting sets how often Device Console checks for a new release or updated firmware. Click on the **Check Now** button to force it to check immediately.

The **Modes** selection sets Device Console to display with a light theme, a dark theme, or with the same theme as your operating system (Windows or macOS). If you choose the System option, you may need to quit Device Console and restart it for the change to take effect.

The **Install USB Audio Driver** feature installs the latest version of the miniDSP UAC2 audio driver. It appears on *Windows* only. See Installation for more information.

Create Program Snapshot

The **Create Program Snapshot** feature is used to help miniDSP Support diagnose issues you may be having with your unit. See Obtaining Support.

Beta releases

To enable beta releases of Device Console and device firmware, set the **Beta Releases** toggle switch to **on**. If you want to then check for a beta release immediately, click the **Check Now** button.

> **Warning**
>
> Beta software may have bugs and operational issues, and there is no support in the normal sense for beta software. Turn this feature on only if you are very familiar with how Device Console works and are willing and able to report bugs and provide troubleshooting information. Most users should **not** turn this feature on.
>
> If you experience a significant bug while using beta software, please open a support ticket to report the issue, providing as much detail as possible including screenshots and a program snapshot.

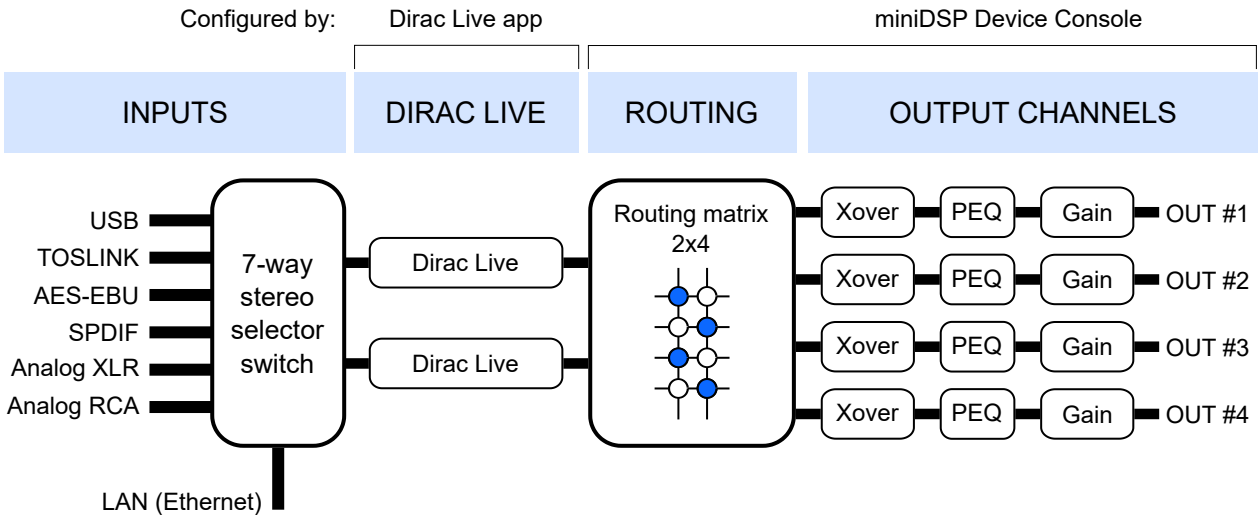
Device Console will need to restart after installing the beta version. It will then prompt to upgrade the firmware if there is beta firmware available.

To revert from the beta version back to the previous stable version, set the **Beta Releases** toggle switch to **off**. Then click the **Check Now** button. Device Console will need to restart after installing the stable version. You will then need to *manually* refresh the DSP and XMOS firmware.

Signal Flow

Signal flow

The diagram below is a simplified representation of the signal flow through the miniDSP SHD:



Signal flow of the miniDSP SHD

The audio signal in the diagram flows from left to right:

1. One of the seven stereo input sources is selected by the user. The per-input volume offset is applied to the input channels at this stage.
2. The selected input signal is passed through **stereo** Dirac Live processing.
3. The processed input channels are fed into a 2-in 4-out routing matrix that routes/mixes the two processed input channels to the four output channels.
4. Each output channel runs a comprehensive set of DSP functions: parametric EQ, crossovers, delay, output gain and compressor.
5. Finally, the master volume control is applied and output levels are captured for display in Device Console.

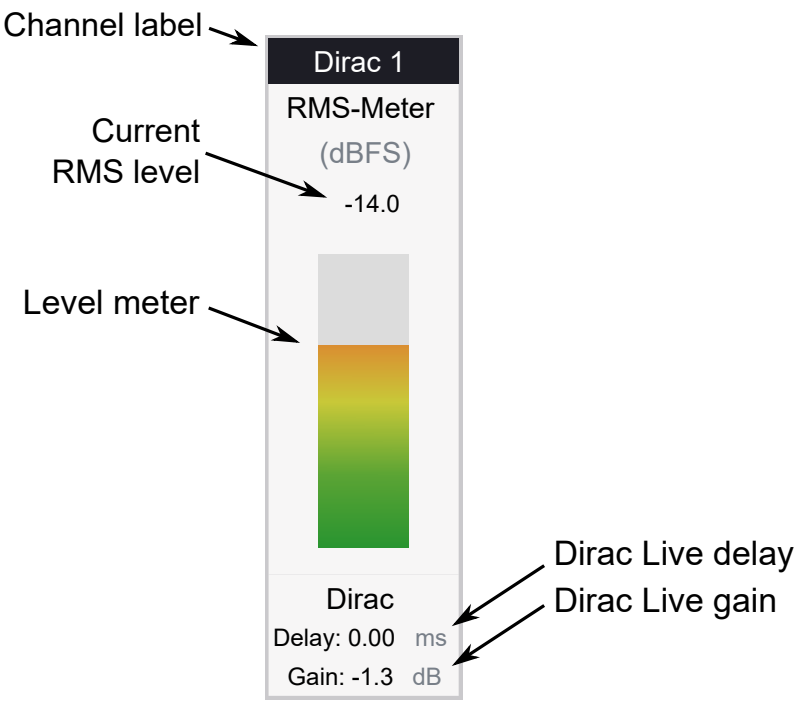
The combination of the routing matrix and the crossover blocks on the output channels is what gives the miniDSP SHD the ability to be used in many different system configurations.

> **Tip**
>
> When using Dirac Live, first set up the matrix mixer and the output channel crossovers using the miniDSP Device Console. Then in the Dirac Live app, export the generated filters into the same-numbered slot. For example, if you set up preset 2 in DC, export the filter in Dirac Live to slot 2.

Input Channels

Overview

The different elements on each control strip are shown here:



Channel label

Each input channel has a customizable label displayed at the top of the channel strip. To change the label, click on it and type a new label (up to 12 characters).

Current RMS level, Level meter

Displays the current input signal level in real time, after the per-input volume offset has been applied.

The range of the visual bargraph is -72 dB up to +12 dB.

> **Info**
>
> The SHD must be connected and online to display signal levels.

Dirac Live delay

The delay (in milliseconds) that Dirac Live has set for this channel. This cannot be changed directly by the user.

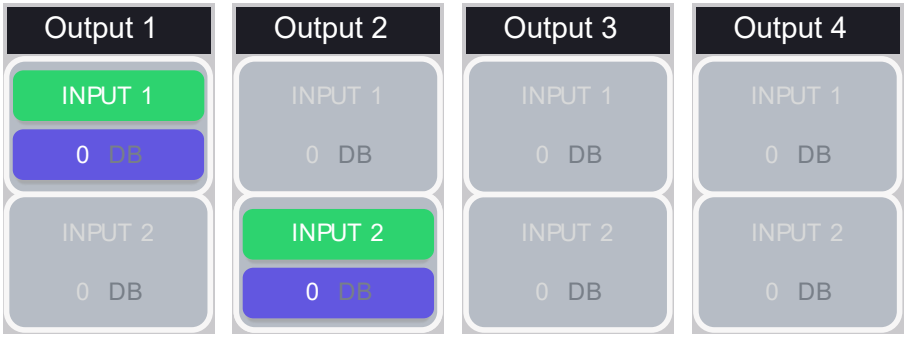
Dirac Live gain

The gain (in dB) that Dirac Live has set for this channel. This cannot be changed directly by the user.

Signal routing

Overview

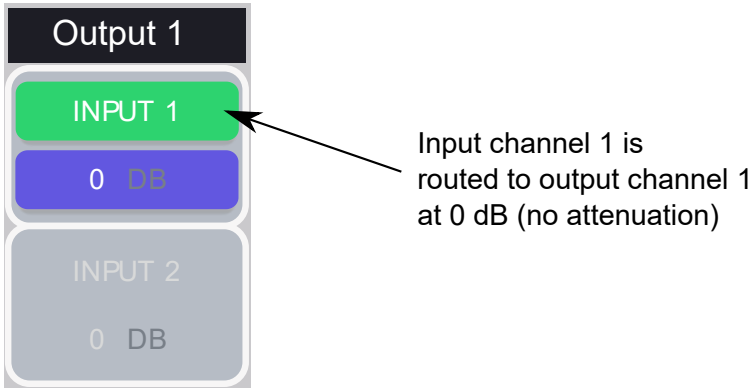
Each input channel can be sent, or *routed*, to any number of output channels. This is accomplished with the routing buttons at the top of the output channel strips. This is the default routing:



In addition to routing, the miniDSP SHD supports mixing, where input channels can be mixed at different levels to a single output channel. The complete set of routing controls along the top of the output channel strips is therefore also called the "matrix mixer."

Basic routing

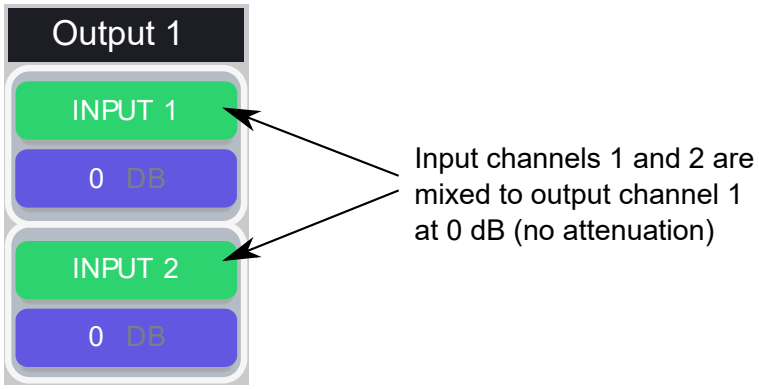
To route an input channel to an output channel, click on the input channel's name. When routed, the button is green:



Note: if the input channel has been renamed, its name will appear instead of e.g. "Input 1".

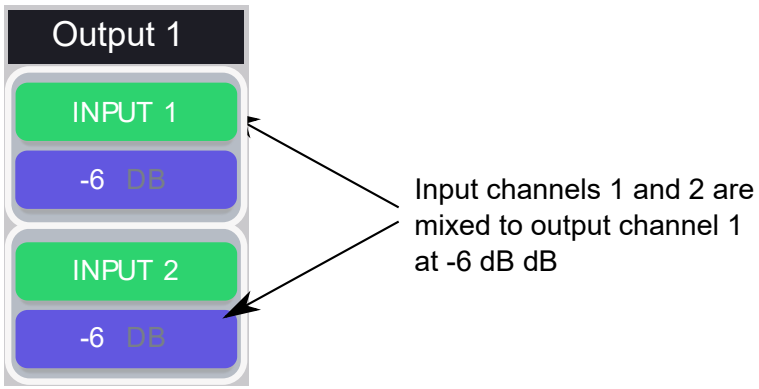
Mixing

To mix both input channels to an output, select both of them:



By default, each input channel is mixed at "full strength" – that is, without any attenuation, as indicated by the "0 dB" label. To mix at different levels, click on the level button and either use the slider or enter the desired value directly. The gain of the signal being mixed can be set to a value between -72 and +12 dB.

In this example, both channels are mixed at half level (-6 dB):



Routing examples

This section illustrates a few examples of signal routing. In these examples, the input and output channels have been renamed by typing in the labels at the top of the channel strips. We recommend you do the same to help avoid errors.

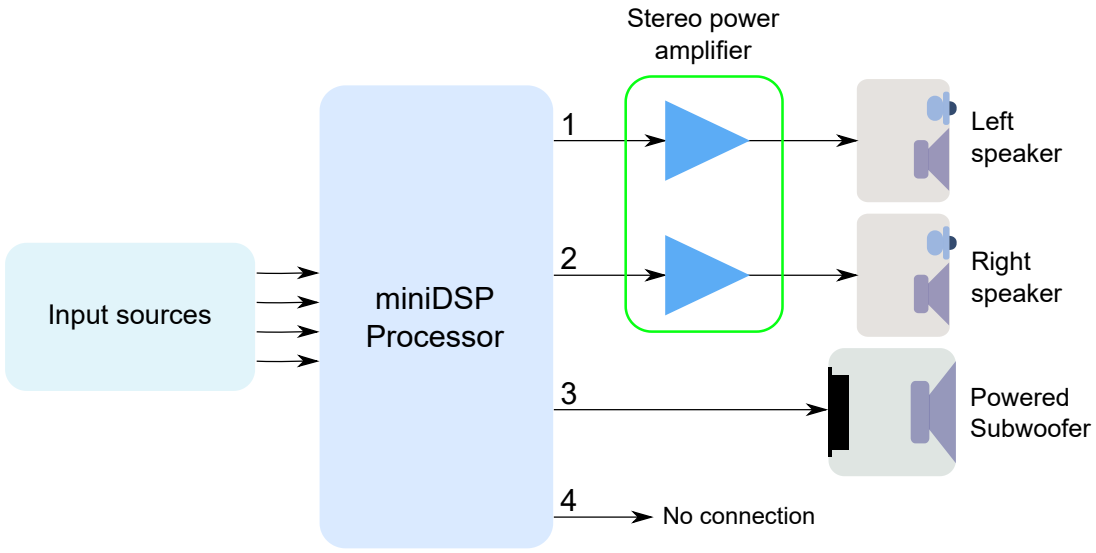
Subwoofer integration

The diagram below shows the connections for a stereo pair of speakers plus a single powered subwoofer. This is the simplest type of active system, so is a good introduction to the advanced features of the miniDSP SHD. It is also known as a "2.1" system.

The stereo amplifier is connected to outputs 1 and 2, and the subwoofer is connected to output 3.

Info

The examples in the diagrams show a powered subwoofer. If using a passive subwoofer, a separate amplifier will be needed. Never connect an output of the SHD directly to a subwoofer driver or to a speaker or speaker driver.



Typical connections for subwoofer integration with the miniDSP SHD

Rename the input and output channels accordingly, then set up the routing matrix:

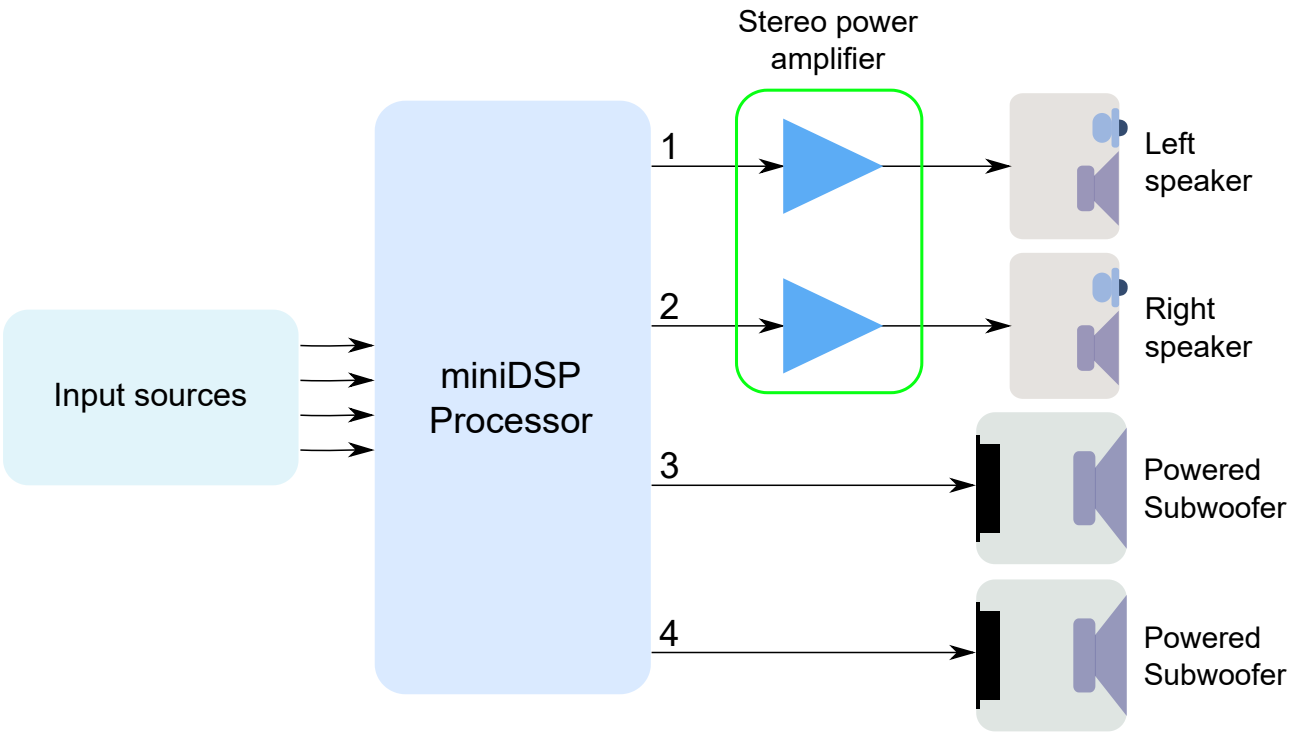
The left and right inputs are sent to outputs 1 and 2. Both inputs are summed and sent to output 3. Outputs 1 and 2 will need a high pass crossover filter to remove the sub frequencies, while output 3 will need a low pass crossover filter.

For a tutorial-style walkthrough, see these application notes on our website:

- 2.1 Subwoofer Integration with miniDSP and REW (https://www.minidsp.com/applications/subwoofer-tuning/sub-integration-rew)
- Subwoofer Integration with miniDSP and stereo Dirac Live (https://www.minidsp.com/applications/subwoofer-tuning/sub-integration-dirac)

Dual subwoofers

The diagram below shows the connections for a stereo pair of speakers plus two powered subwoofers:



Typical connections for dual subwoofers with the miniDSP SHD

We will assume that the two subwoofers are driven as "mono" subs – that is, they both take the sum of the left and right channels at low frequencies. Rename the input and output channels accordingly, then set up the routing matrix:

Outputs 1 and 2 will need have a high pass crossover filter to remove the sub frequencies, while outputs 3 and 4 will have a low pass crossover filter.

To begin with, you may wish to simply set the time delay on both subwoofers and speakers to match the relative distances from the listening position. Then proceed as for the single-subwoofer case using one of these application notes:

- 2.1 Subwoofer Integration with miniDSP and REW (https://www.minidsp.com/applications/subwoofer-tuning/sub-integration-rew)

- Subwoofer Integration with miniDSP and stereo Dirac Live (https://www.minidsp.com/applications/subwoofer-tuning/sub-integration-dirac)

For more advanced use, the two subwoofers can be treated as a "multisub" system. In this case, the processing on the subwoofer output channels is adjusted to obtain the least variation around the listening area. A walkthrough using the sophisticated MSO (multi-sub optimizer) program to optimize the subs *and* the speakers is given in this app note:

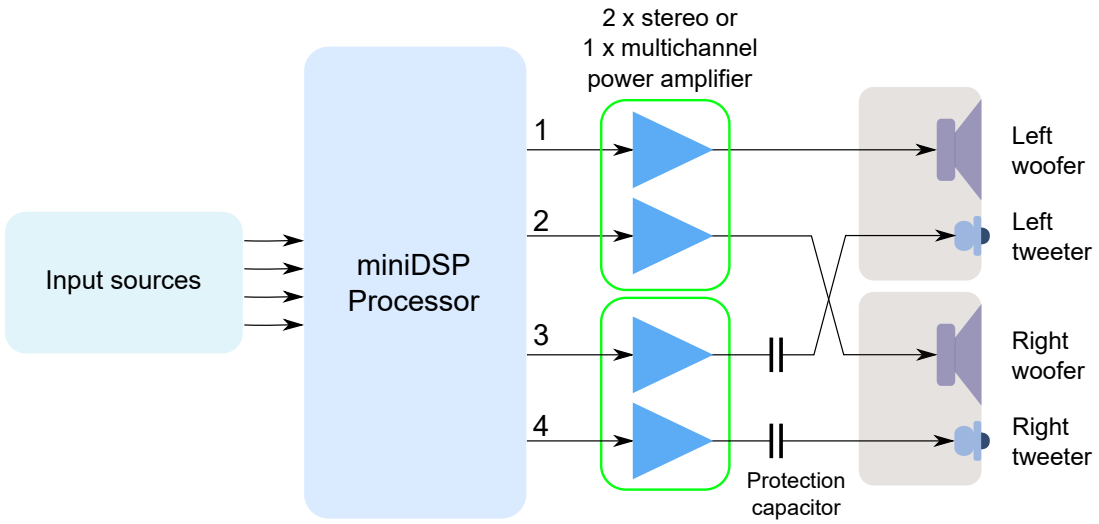
- Dual-sub integration with miniDSP and MultiSub Optimizer (https://www.minidsp.com/applications/subwoofer-tuning/dual-sub-with-mso)

Alternatively, you can optimize the subs first, then integrate with the speakers as for the single-subwoofer case. For an introduction to methods of optimizing a group of subwoofers, see this application note:

- Tuning multiple subwoofers with miniDSP (https://www.minidsp.com/applications/subwoofer-tuning/tuning-multiple-subs)

Two-way active speaker

The diagram below shows the connections for a two-way active speaker. Amplification can be either a multichannel amplifier or a pair of stereo amplifiers.



Typical connections for a two-way active speaker using the miniDSP SHD

Rename the input and output channels accordingly, then set up the routing matrix:

The left input is routed to outputs 1 and 3, and the right input is routed to outputs 2 and 4. Each output channel will need a low pass filter for the woofers or a high pass filter for the tweeter.

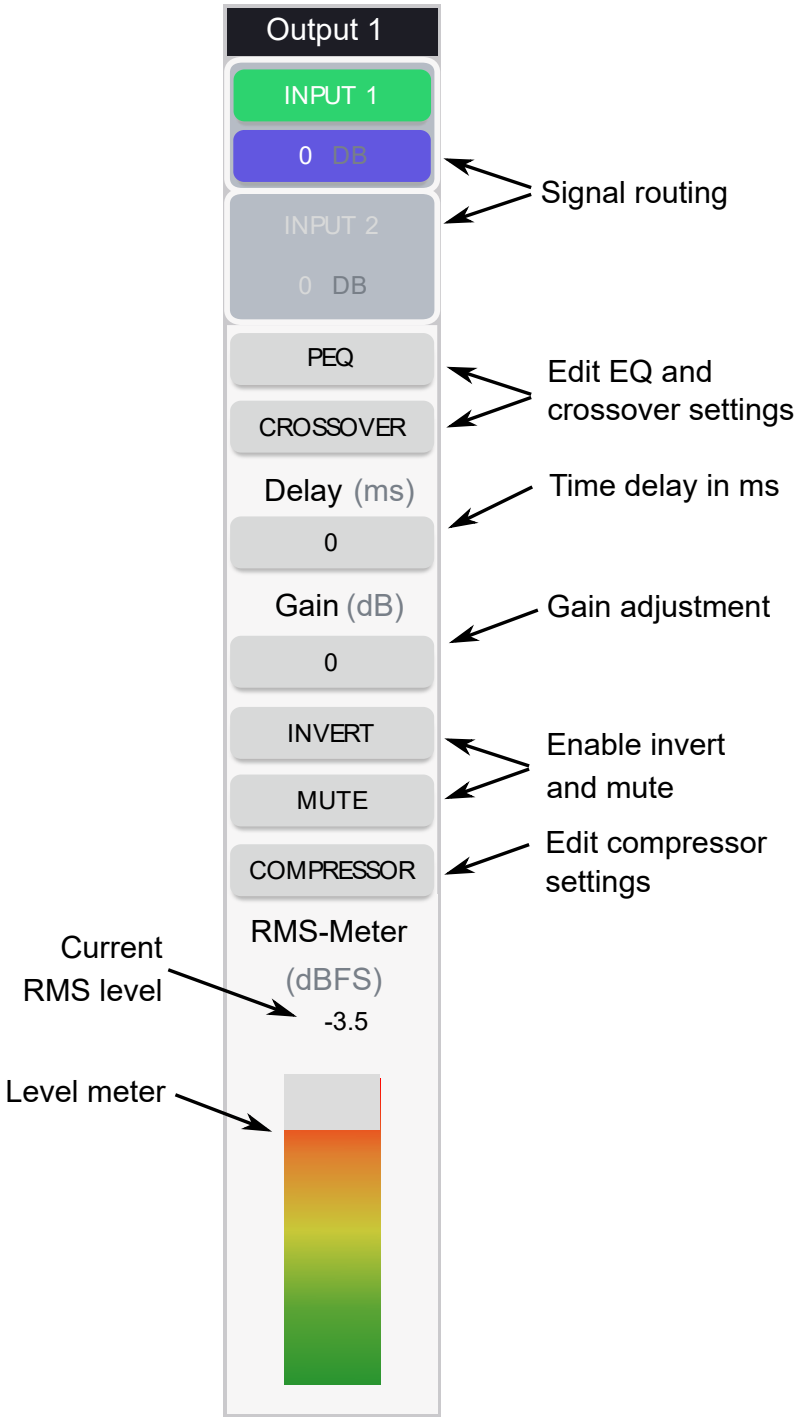
For a tutorial-style walkthrough, see this application note on our website:

- Designing a 2-way active speaker with miniDSP (https://www.minidsp.com/applications/digital-crossovers/two-way-crossover)

Output Channels

Overview

Each of the four output channels has a complete "strip" of controls:



Channel label

Each output channel has a customizable label displayed at the top of the channel strip.

To change the label, click on it and type a new label (up to 12 characters).

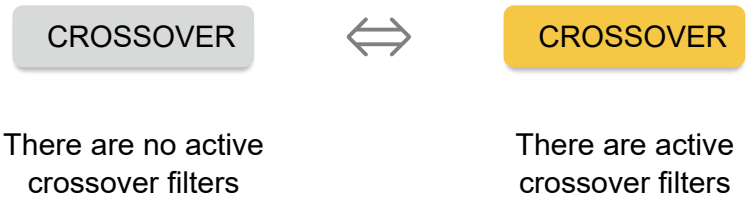
Signal routing

Sets the routing from input channels to output channels. See Signal routing.

CROSSOVER

Click on this button to open the crossover settings window for that output channel.

If there are crossover filters enabled, the color of the button changes to yellow. This provides an at-a-glance indication of crossover status:

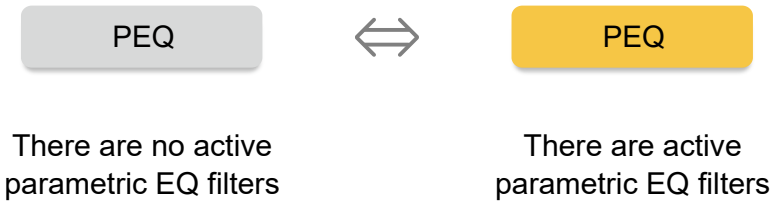


For more information, see the page Crossover.

PEQ

Click on this button to open the parametric EQ settings window for that output channel. There are 10 parametric EQ filters on each output channel.

If there are active parametric EQ filters, the color of the button changes to yellow. This provides an at-a-glance indication of filter status:



For more information, see the page Parametric EQ.

Time delay

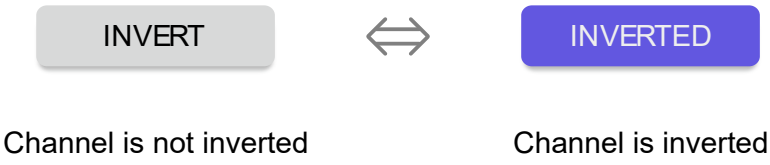
A delay of up to **30 ms** can be applied to each output channel. To set the delay, click on the delay button for a channel. The delay value can be entered by moving the slider or it can be entered numerically. The up and down arrow keys can be used to change the delay in **0.01 ms** increments.

Gain adjustment

The gain of each output channel can be set to a value between -72 dB and +12 dB. (0 dB, the default, is unity gain or no change in level.) To set the gain, click on the Gain value of that channel. The gain can be entered by moving the slider or it can be entered numerically. The up and down arrow keys can be used to change the gain in 0.1 dB increments.

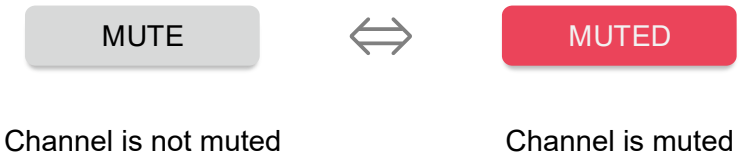
Invert

Each output channel can be inverted in polarity. To invert, press the Invert button. The status is indicated by a change in color and label:



Mute

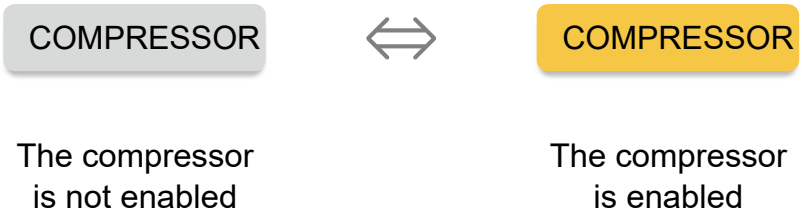
Each output channel can be individually muted. To mute it, press the Mute button. The status is indicated by a change in color and label:



Compressor

Click on this button to open the compressor settings window for that output channel.

If the compressor is enabled, the color of the button changes to yellow. This provides an at-a-glance indication of compressor status:



For more information, see the page Compressor.

Current RMS level, level meter

Displays the current signal level on that output channel in real time, after master volume has been applied.

The range of the visual bargraph is -72 dB up to +12 dB.

> **Info**
>
> The SHD must be connected and online to display signal levels.

DSP Reference

DSP Reference

The miniDSP SHD includes several DSP (digital signal processing) functions designed specifically for audio applications. The design of the user interface makes these much easier to use than traditional engineering tools.

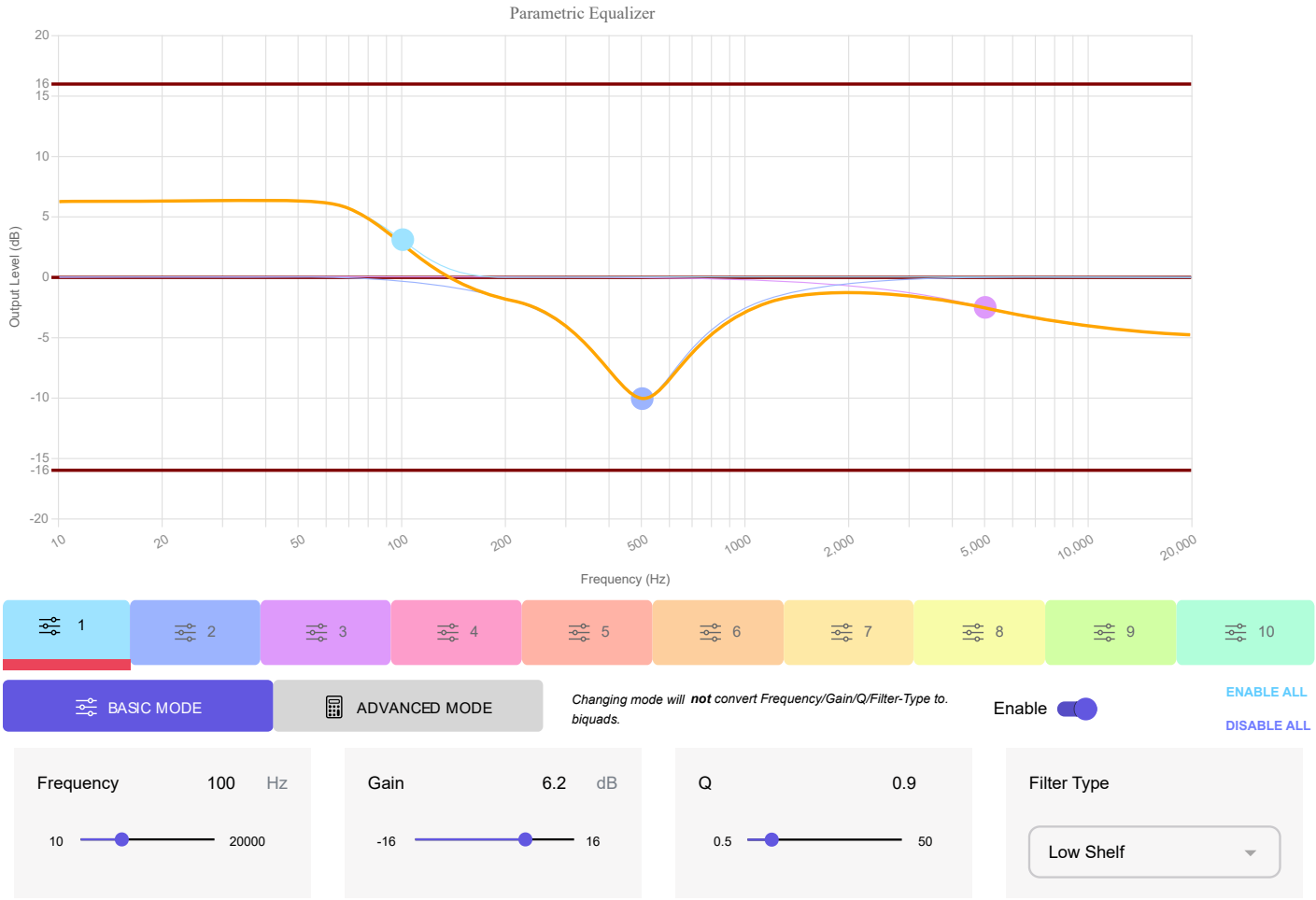
This section provides full details of these functions. Pages in this section:

Parametric EQ

Parametric equalization (PEQ) is a flexible type of equalization filter. It can be used to correct for errors in loudspeaker output, to compensate for acoustic room effects, and to tailor the overall system response for best sound.

Overview

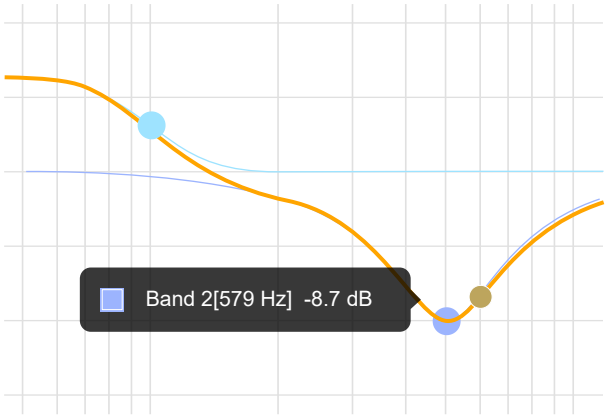
Click on the PEQ button to open the parametric equalizer settings window:



The miniDSP SHD has 10 parametric EQ filters on each output channel. The graph displays the response of each filter in a light color and the combined response of all enabled filters as a heavy line. For example, the curve shown above has a low-shelf boost at 100 Hz, a dip at 500 Hz, and a high-shelf cut at 5000 Hz.

Editing filters

Change the frequency and gain of each filter by clicking and dragging on the drag-points (colored circles) on the graph. The full set of parameters can be edited as described below. Hovering the mouse over any curve brings up an overlay showing the frequency and the gain at that frequency.

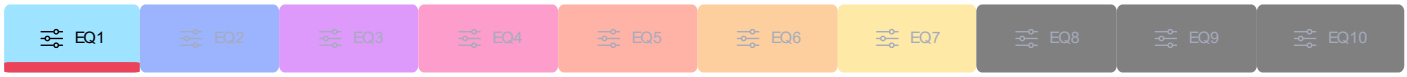


Disabling individual filters

All 10 filters are enabled by default. To disable a single filter, select it with the row of buttons, then click on the Enable button to turn it off:

Filter is enabled Filter is disabled

Disabled filters are greyed out, as illustrated in this example in which filter bands 8 through 10 are disabled:



Note also that a filter will have no effect if its gain is set to 0.0 (except for filters of type All Pass, which have no gain parameter).

Disabling and enabling all filters

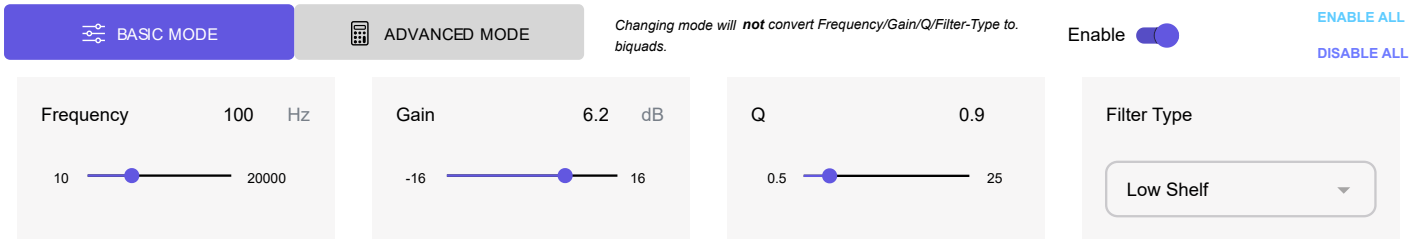
All 10 filters can be disabled and enabled by a click on the Disable All or Enable All buttons:

Note that these buttons disable or enable **all** filters. For example, if you have filters 1 to 7 enabled and filters 8 to 10 disabled, then clicking Disable All followed by Enable All will result in **all** filters being enabled, including filters 8 to 10.

Filter mode

The parametric EQ filters can be set in either basic mode or advanced mode. Basic mode allows each filter to be specified simply by providing four parameters, while advanced mode requires the use of a separate design program.

Basic mode



The shape of the parametric EQ filters is set with a small set of intuitive parameters.

Frequency

For PEAK filters, this is the center frequency of the peak or dip. For HIGH_SHELF and LOW_SHELF filters, this is the frequency at which the gain is half of the set value. For ALL_PASS filters, this is the center frequency of the phase shift.

Gain

For PEAK filters, this is the gain in dB at the center frequency. For HIGH_SHELF and LOW_SHELF filters, this is the gain in dB reached at high or low frequencies respectively. A filter has no effect if its gain is set to 0 dB. Gain can be adjusted in increments of 0.1 dB up to +/- 16 dB. This item is not present for the ALL_PASS filter type.

Q

Q controls the "sharpness" of the filter. For PEAK filters, lower Q gives a broader peak or dip, while higher Q gives a narrower peak or dip. For HIGH_SHELF and LOW_SHELF filters, Q controls how quickly the filter transitions from no gain to maximum gain. For ALL_PASS filters, higher Q gives a steeper phase transition.

Filter type

Selects the type of filter:

PEAK

Create a dip or a peak in the frequency response.

LOW_SHELF

Reduce or increase part of the frequency spectrum *below* a given frequency.

HIGH_SHELF

Reduce or increase part of the frequency spectrum *above* a given frequency.

ALL_PASS

Create a phase shift across the frequency band. This can be useful for correcting phase issues and for simulating analog crossovers.

Keyboard and mouse operations

Most parameters can be navigated and set using the keyboard. The Tab key will move focus between fields; Shift-Tab will move in the opposite direction.

Except for Filter Type, parameters can be edited by:

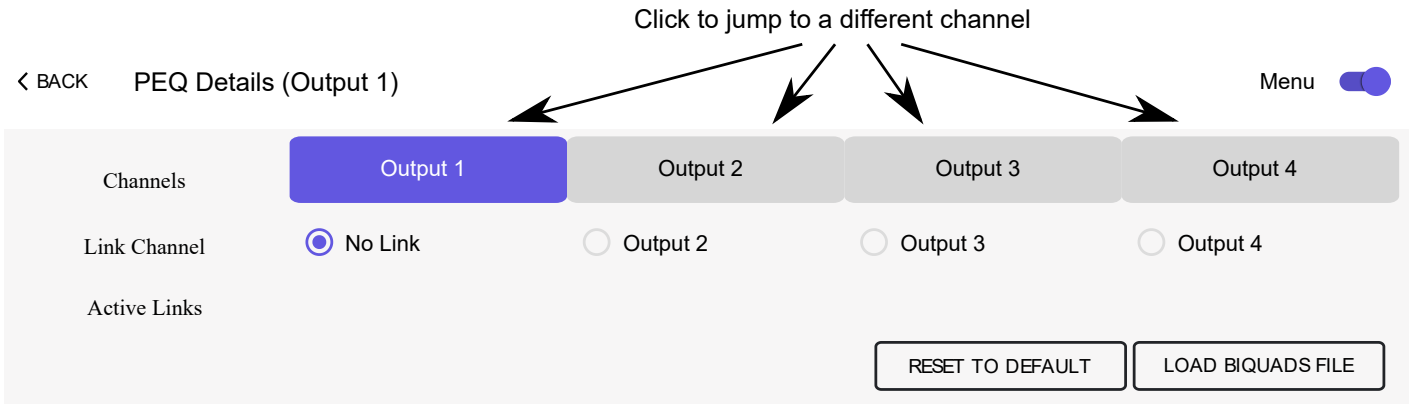
1. Clicking and dragging on a slider. Once the focus is on a slider, you can also change the value with the left and right arrow keys on the keyboard.
2. Clicking in the value field and typing a new value. Once the focus is in a value field, you can also change the value with the up and down arrow keys on the keyboard.
3. Move the mouse cursor over the parameter and use the mouse scroll wheel or equivalent gesture on a trackpad.

For Filter Type, once the focus is in the field, press:

1. Space or Enter to bring up the selection menu,
2. Tab to move the focus to the menu,
3. The up and down arrows to move the focus up and down the menu,
4. Space to select the current menu entry and close the menu.

Jumping between channels

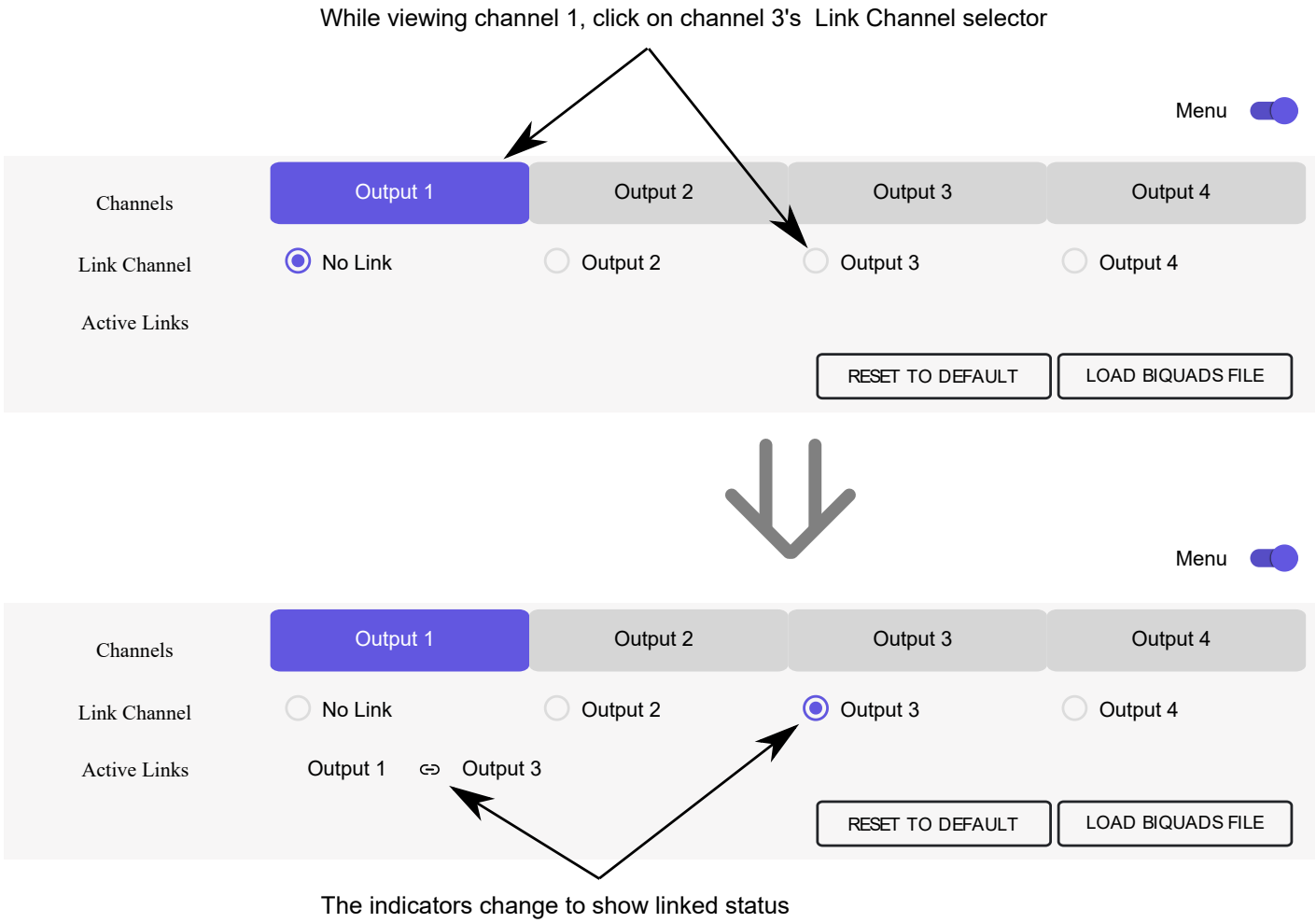
To jump quickly between the parametric EQ window of different channels, enable the Menu switch at the top right. Jump to a different channel by clicking on the row of buttons:



Linking channels

Each channel can be linked to one other channel. When a channel is linked to another, the PEQ settings of that channel are mirrored to the other. Typically, corresponding channels on the left and right are linked: for example, left and right tweeter and left and right woofer.

To link a channel, enable the Menu switch at the top right. Click on the channel that you want to link the current channel to. After confirming, an indicator appears to show the new link:



Info

A channel can be linked to only one other channel. That is, you cannot link three or more channels.

Reset to default

To reset all parametric EQ filters of the current channel to the default settings, enable the Menu switch at the top right and click the RESET TO DEFAULT button:

Warning

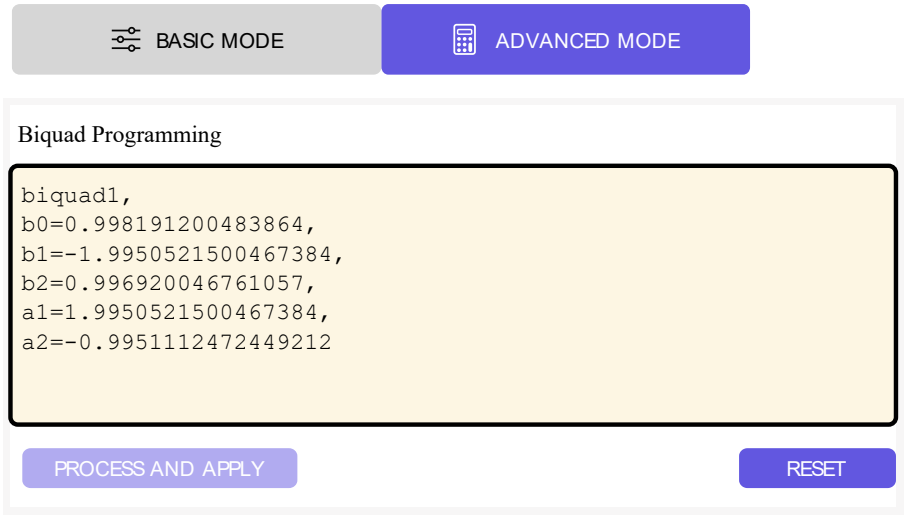
This operation is not reversible, so be sure you mean to reset all of your filters! Save your settings to a file first if you need to keep any.

Advanced mode

Advanced mode enables custom biquad programming for almost infinite flexibility in filter implementation. In this mode, each individual filter to be specified by its *biquad coefficients*. The coefficients must be generated by a design program such as Room EQ Wizard (REW). The design program must be set for a **96 kHz** sample rate.

Programming a single biquad

Each parametric EQ filter can be individually switched to advanced mode. Paste in the coefficients in the format shown and click on the **PROCESS AND APPLY** button for them to take effect. Click the **RESET** button to set the coefficients back to their default values.



Info

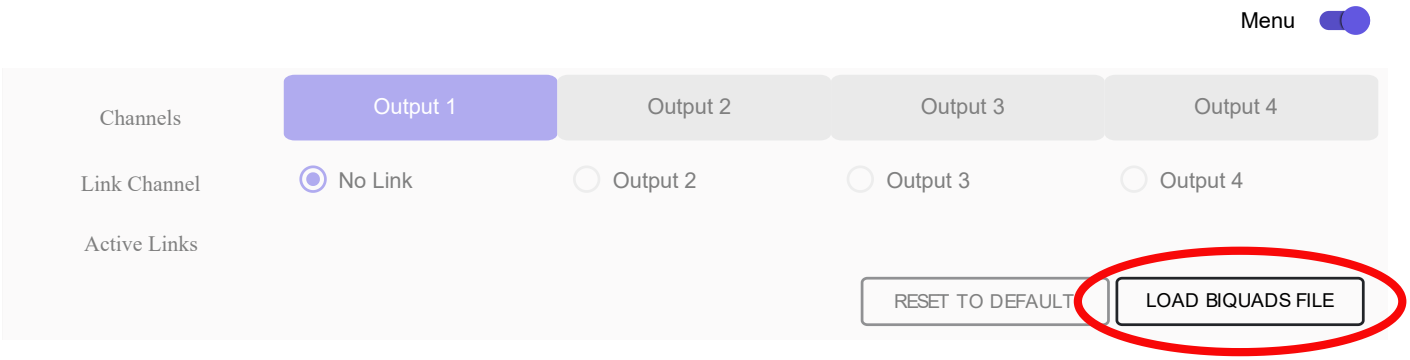
Switching between basic and advanced mode does not convert between Frequency/Gain/Q and biquad parameters. The basic parameters and advanced biquad coefficients for each filter are stored independently and the selected set is used for processing.

Loading a biquad file

Multiple biquads can be set at once by loading a file containing biquad coefficients. This example illustrates the correct file format:

```
biquad1,
b0=0.998191200483864,
b1=-1.9950521500467384,
b2=0.996920046761057,
a1=1.9950521500467384,
a2=-0.9951112472449212,
biquad2,
b0=0.999640139948623,
b1=-1.9981670485581222,
b2=0.9985489719847982,
a1=1.9981670485581222,
a2=-0.9981891119334211,
biquad3,
..
biquad4,
..
biquad10,
b0=1.0010192374642126,
b1=-1.9950555192569264,
b2=0.9940580112181501,
a1=1.995060938714333,
a2=-0.9950718292249559
```

To load the file, select the Menu switch at the top right and click the **LOAD BIQUADS FILE** button. The filters are set to advanced mode starting at EQ1.



If the loaded file contains fewer than 10 biquads, then only that number of EQ filters will be set to Advanced mode. For example, if loading a file with six biquads, EQ1 to EQ6 will be set to Advanced mode, and EQ7 to EQ10 will not be changed. This can be used to good effect in cases where manually-set parametric EQ (in Basic mode) is required in addition to parametric EQ developed with a design program.

If the loaded file contains more than 10 biquads, then only the first 10 will be loaded.

Biquad design software

Following are programs that can be used to design your biquad coefficients. The design program must be set for a **96 kHz** sample rate.

Biquad calculation spreadsheet

The community-developed biquad calculation spreadsheet allows many filter types to be calculated, including notch filters, Linkwitz transforms, and filters with arbitrary Q-factor. Access this spreadsheet here (requires Microsoft Excel):

- Download zipped spreadsheet from miniDSP.com (https://www.minidsp.com/images/fbfiles/files/All_digital_coefs_v1-20101026.zip)

Room EQ Wizard (REW)

Room EQ Wizard is a free acoustic measurement and analysis tool, available for Windows, Mac and Linux platforms. It includes the ability to automatically generate a bank of parametric EQ biquads based on a measurement. These coefficients can be saved to a file from REW and loaded using the Device Console. Room EQ Wizard can be downloaded from:

- Room EQ Wizard downloads (https://www.roomeqwizard.com/#downloads)

For guidance on using this feature, refer to the app note Auto EQ with Room EQ Wizard (https://www.minidsp.com/applications/rew/rew-autoeq-step-by-step) .

Crossover

Crossovers "split" the frequency band to send to different drivers. In a two-way loudspeaker, for example, a *low pass* filter is used to remove high frequencies from the signal sent to the woofer, and a *high pass* filter is used to remove low frequencies from the signal sent to the tweeter.

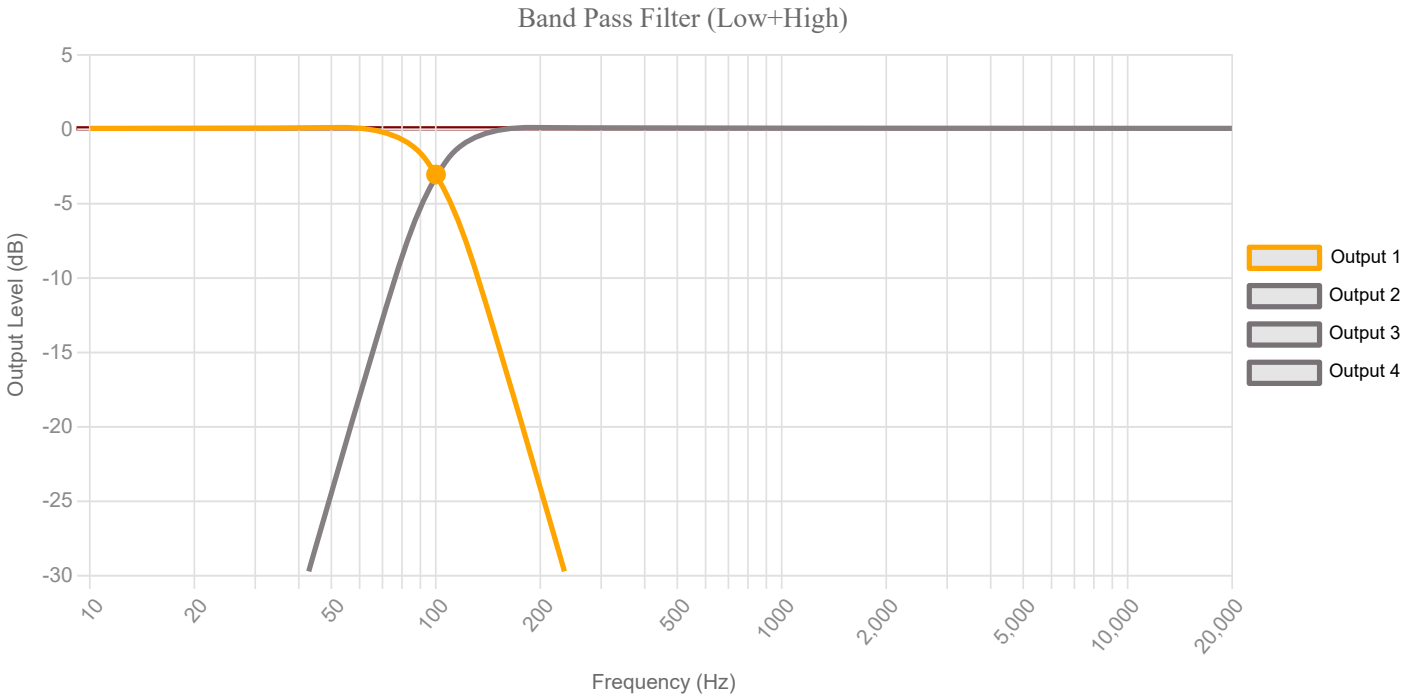
When integrating a subwoofer, high pass filters are used on the speakers and a low pass filter on the subwoofer.

Crossover filters can also be used to limit low frequency content delivered to a speaker or subwoofer, to help protect it from over-excursion.

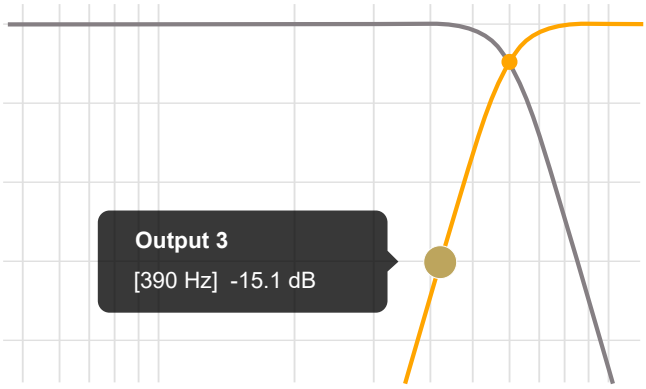
Unlike conventional analog crossovers, the flexibility of DSP allows a completely arbitrary mix of different filter slopes and types. Filters can be set at any frequency or disabled completely. This allows maximum flexibility in matching your crossover to the acoustic characteristics of the loudspeaker drivers.

Overview

Each output channel has independent high pass and low pass crossover filters. Click on the **CROSSOVER** button to open the crossover settings window:

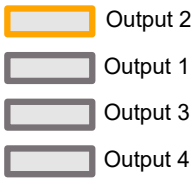


The current channel is displayed in orange, with the others displayed in grey. Hovering the mouse over the curve brings up an overlay showing the frequency and the attenuation at that frequency.



Info

The channel names on the right hand side may be out of order. This is an unavoidable artifact of the library used to draw the graphs: the graph that displays on top also comes first in the list.

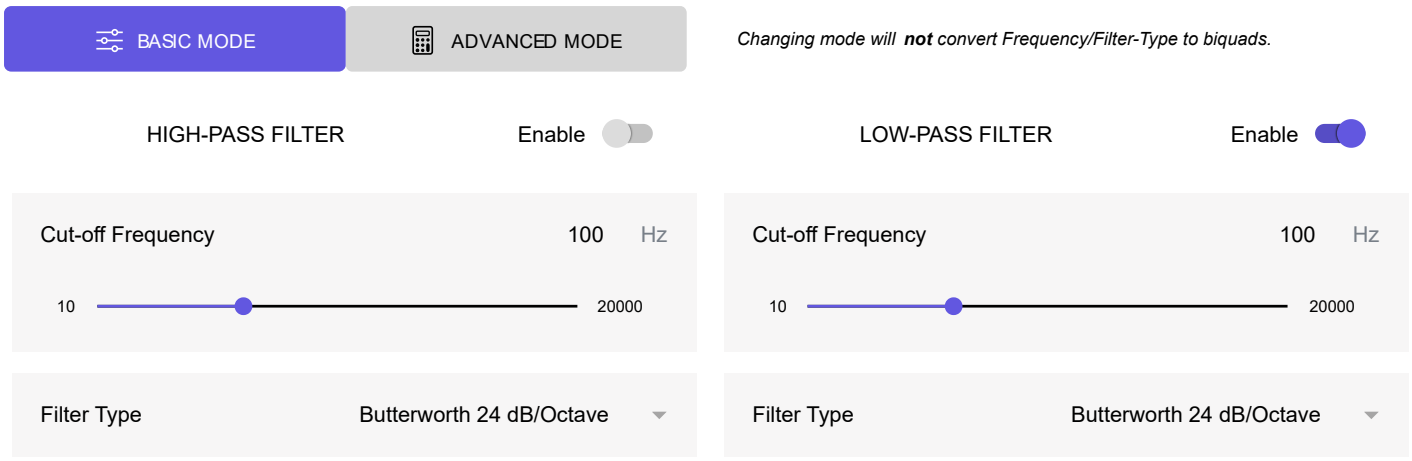


Crossover mode

The crossovers on each output channel can be set in either basic mode or advanced mode. Basic mode allows each crossover filter to be specified simply by providing two parameters, while advanced mode requires the use of a separate design program.

Basic mode

In basic mode, there are two crossover filters on each output channel: high pass (removes low frequencies) and low pass (removes high frequencies). In basic mode, these two filters are completely independent and each has its own settings.



Enable

The crossover filters are disabled by default. To enable a crossover filter, click on the Enable switch.

Crossover filter is disabled Crossover filter is enabled

Cut-off frequency

Sets the nominal cutoff frequency of the crossover. In actual fact, the crossover has a more or less gradual transition from "full on" to "full off," as determined by the filter slope.

Filter type

Selects the type and slope of the filter. The steeper the slope, the more quickly frequencies above or below the cutoff frequency are attenuated. There are three types of filter:

Butterworth (BW)

Available in 6, 12, 18, 24, 30, 36, 42, and 48 dB/octave, Butterworth crossover filters are 3 dB down at the cutoff frequency.

Linkwitz-Riley (LR)

Available in 12, 24, and 48 dB/octave, Linkwitz-Riley crossover filters are 6 dB down at the cutoff frequency.

Bessel

Available in 12 dB/octave only, a Bessel filter gives a more gradual roll-off through the crossover region.

Keyboard and mouse operations

Most parameters can be navigated and set using the keyboard. The Tab key will move focus between fields; Shift-Tab will move in the opposite direction.

Except for Filter Type, parameters can be edited by:

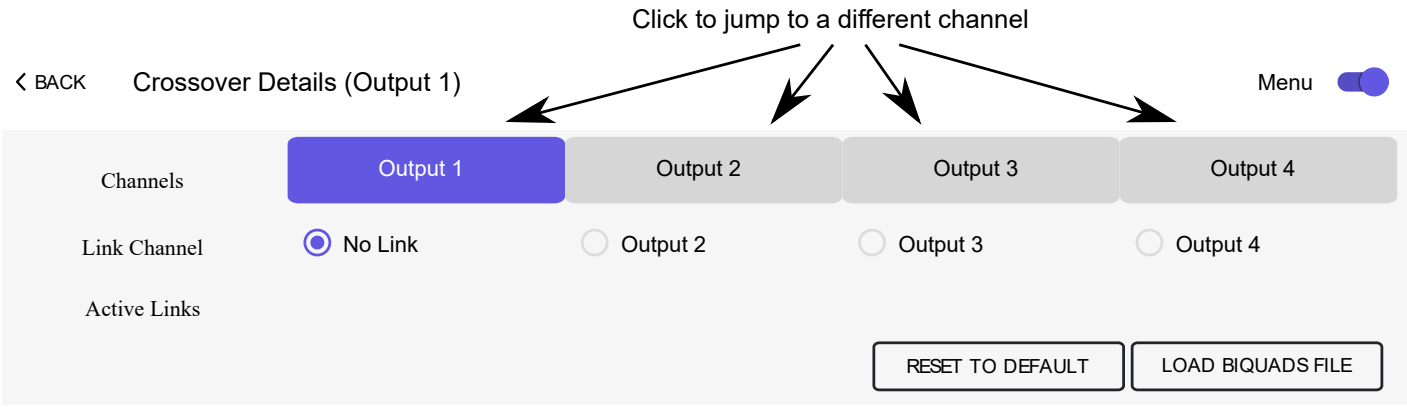
1. Clicking and dragging on a slider. Once the focus is in a value field, you can also change the value with the left and right arrow keys on the keyboard, or by using the mouse scroll wheel or equivalent gesture on a trackpad.
2. Clicking in the value field and typing a new value. Once the focus is in a value field, you can also change the value with the up and down arrow keys on the keyboard, or by using the mouse scroll wheel or equivalent gesture on a trackpad.
3. If the focus is on the Enable button, it can be toggled with the Space key.
4. Move the mouse cursor over the parameter and use the mouse scroll wheel or equivalent gesture on a trackpad.

For Filter Type, once the focus is in the field, press:

1. Space or Enter to bring up the selection menu,
2. Tab to move the focus to the menu,
3. The up and down arrows to move the focus up and down the menu,
4. Space to select the current menu entry and close the menu.

Jumping between channels

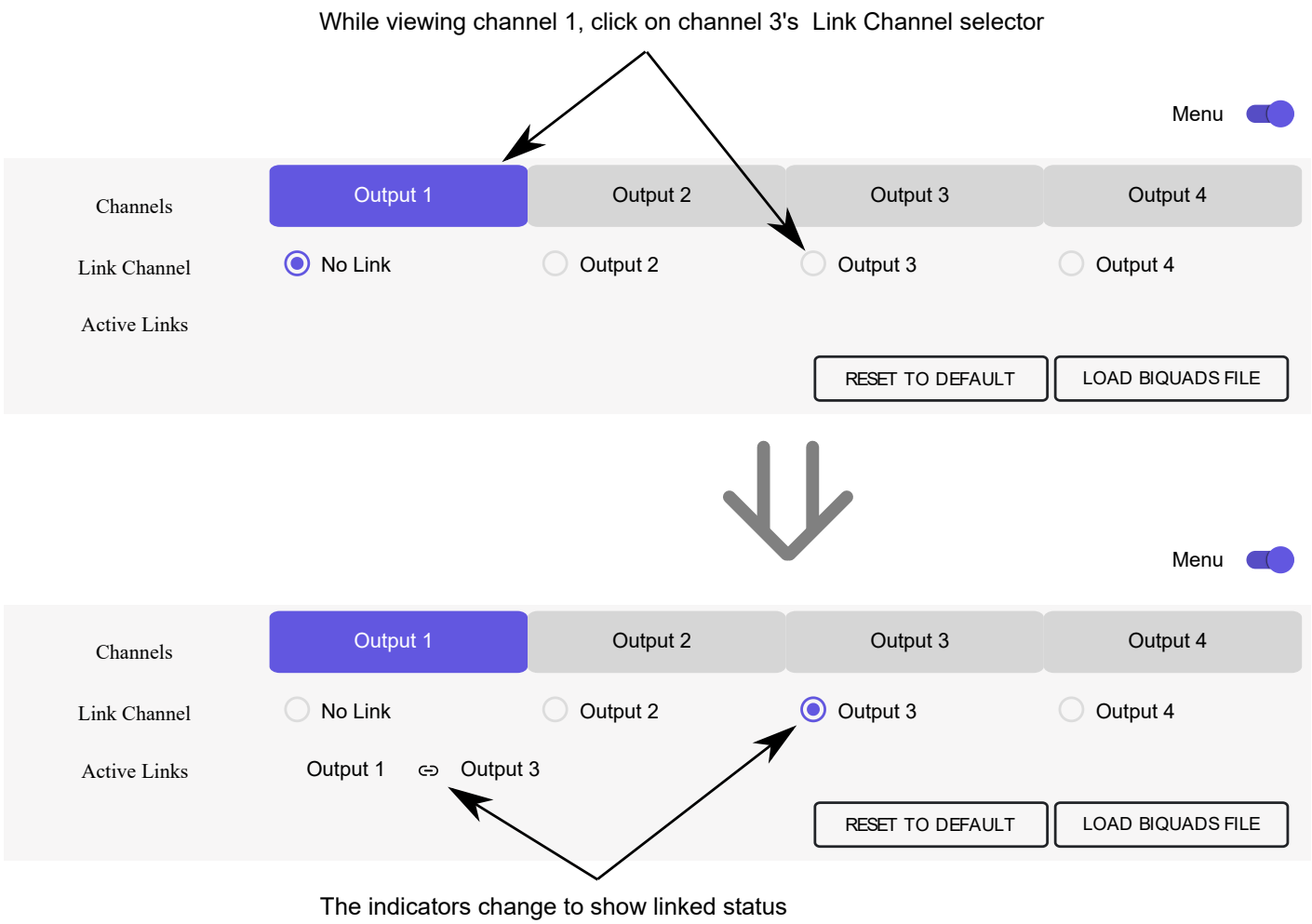
To jump quickly between the crossover window of different channels, enable the Menu switch at the top right. Jump to a different channel by clicking on the row of buttons:



Linking channels

Each channel can be linked to one other channel. When a channel is linked to another, the crossover settings of that channel are mirrored to the other. Typically, the corresponding drivers on the left and right channels are linked: left and right tweeter, left and right woofer, and so on.

To link a channel, enable the Menu switch at the top right. Click on the channel that you want to link the current channel to. After confirming, an indicator appears to show the new link:



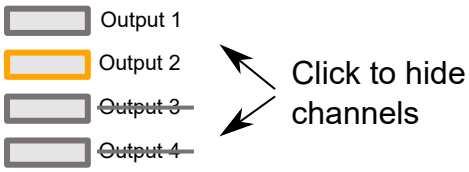
Info

A channel can be linked to only one other channel. That is, you cannot link three or more channels.

Hiding channels

By default, the crossover graph shows the crossovers of all four output channels. The current channel is displayed in orange and the others in black.

If you wish to view only a subset of channels, use the switches to the right of the graph to select channels to hide. In this example, channel 2 is the current channel. Channels 1 and 2 are visible, while channels 3 and 4 are hidden:



In this example, the crossover settings of channels 1 and 2 can be changed by using the channel selection buttons at the top of the window to jump between them. As long as you stay on these channels, the set of hidden channels stays the same. However, if you switch to a hidden channel, that channel then becomes visible. (For example, if you switch to channel 4, then channels 1, 2 and 4 will be visible.)

Advanced mode

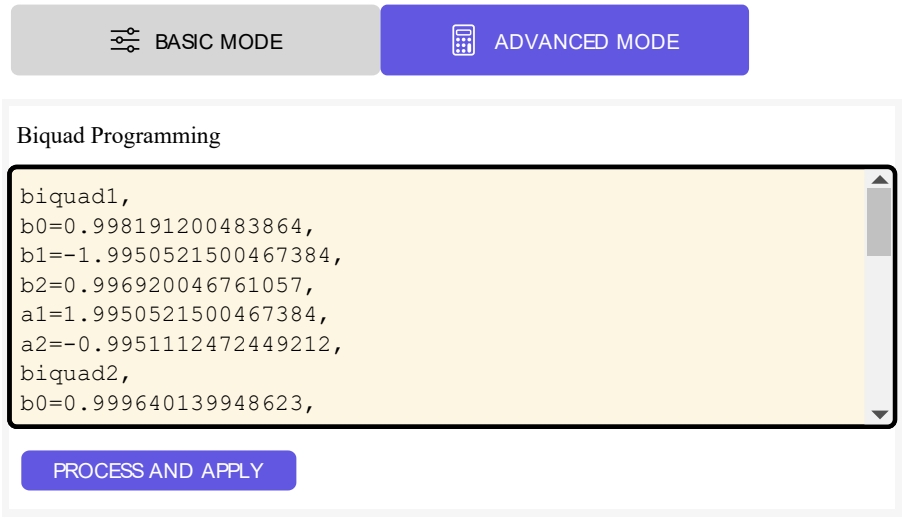
The crossover block on each output channel has eight biquads. In Basic mode, four are allocated to the high pass filter and four to the low pass filter. In Advanced mode, however, the eight biquads are all specified by their coefficients, in the following format:

```
biquad1,
b0=0.998191200483864,
b1=-1.9950521500467384,
b2=0.996920046761057,
a1=1.9950521500467384,
a2=-0.9951112472449212,
biquad2,
b0=0.999640139948623,
b1=-1.9981670485581222,
b2=0.9985489719847982,
a1=1.9981670485581222,
a2=-0.9981891119334211,
biquad3,
..
biquad4,
..
biquad8,
b0=1.0010192374642126,
b1=-1.9950555192569264,
b2=0.9940580112181501,
a1=1.995060938714333,
a2=-0.9950718292249559
```

These biquads can be used for almost infinite flexibility (within the limits of eight biquads). For example, you could use two biquads for a fourth-order high pass filter, and the remaining six for parametric EQ.

Setting biquads for the crossover block

Paste the coefficients into the text box, then click on the **PROCESS AND APPLY** button for them to take effect.



> **Info**
>
> Switching between basic and advanced mode does not convert between Frequency/Filter type and biquad parameters. The basic parameters and advanced biquad coefficients for each filter are stored independently and the selected set is used for processing.

Biquad design software

Following are programs that can be used to design your biquad coefficients. The design program must be set for a **96 kHz** sample rate.

Biquad calculation spreadsheet

The community-developed biquad calculation spreadsheet allows many filter types to be calculated, including notch filters, Linkwitz transforms, and filters with arbitrary Q-factor. Access this spreadsheet here (requires Microsoft Excel):

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Room EQ Wizard (REW)

Room EQ Wizard is a free acoustic measurement and analysis tool, available for Windows, Mac and Linux platforms. It includes the ability to automatically generate a bank of parametric EQ biquads based on a measurement. These coefficients can be saved to a file from REW and loaded using the Device Console. Room EQ Wizard can be downloaded from:

- Room EQ Wizard downloads (https://www.roomeqwizard.com/#downloads)

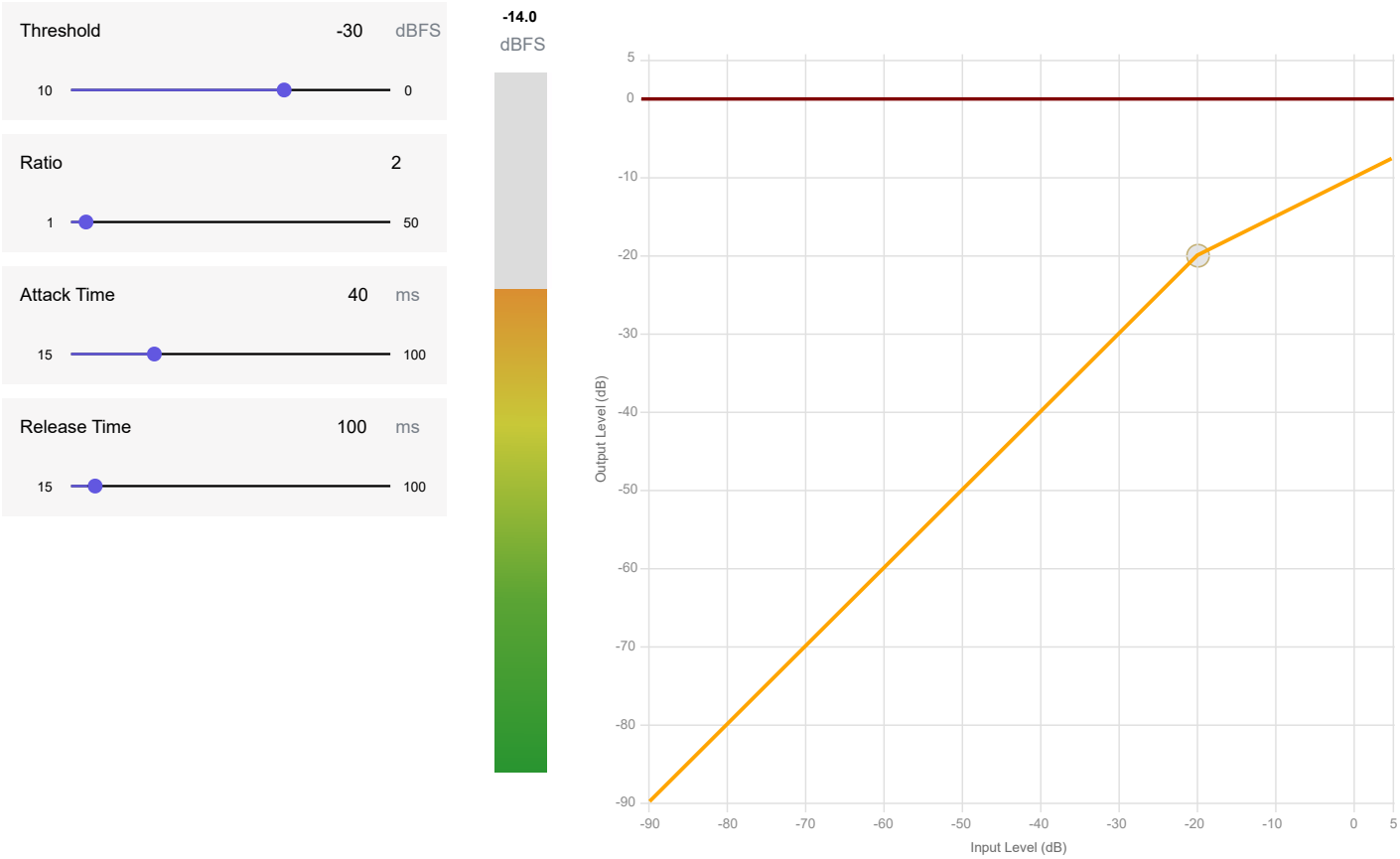
For guidance on using this feature, refer to the app note Auto EQ with Room EQ Wizard (https://www.minidsp.com/applications/rew/rew-autoeq-step-by-step) .

Compressor

The compressor reduces the gain of an output channel when the audio signal reaches the level specified by the **Threshold** parameter. The gain of the channel will be progressively reduced as the signal increases above the threshold, according to the **Ratio** parameter. This can be used to limit the power delivered to speakers and thus reduce the risk of damage from overdriving.

Overview

This screenshot shows an example Compressor setting:



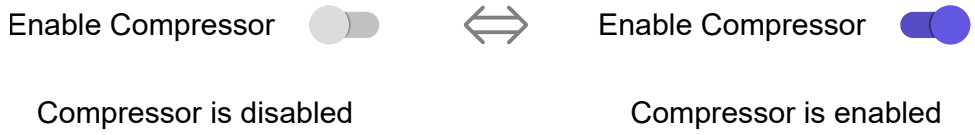
(Note that the compressor algorithm is bypassed by default, so click on the **Bypass** button to see the curve as shown here.)

In this example, the threshold is set to −20 dB, so the compressor will activate when the signal on that channel reaches −20 dB (relative to full output). The ratio is set to 2, so if the input signal level to the compressor then increases by 10 dB, the output level will increase by only 5 dB. If the input signal level to the compressor is at full scale (0 dB), then the output level will be limited to −10 dB.

Two additional parameters control the action of the compressor: the attack time and the release time. These two parameters govern how quickly the compressor activates when the signal level exceeds the threshold, and how quickly it deactivates when the signal level reduces. The optimum settings may need to be tuned by ear. For more information, see the Wikipedia article Dynamic range compression (https://en.wikipedia.org/wiki/Dynamic_range_compression) .

Enable

The compressor block is disabled by default. To enable it, click on the Enable Compressor switch. The graph will change from a dashed grey line (disabled) to a solid colored line (enabled).



Keyboard and mouse operations

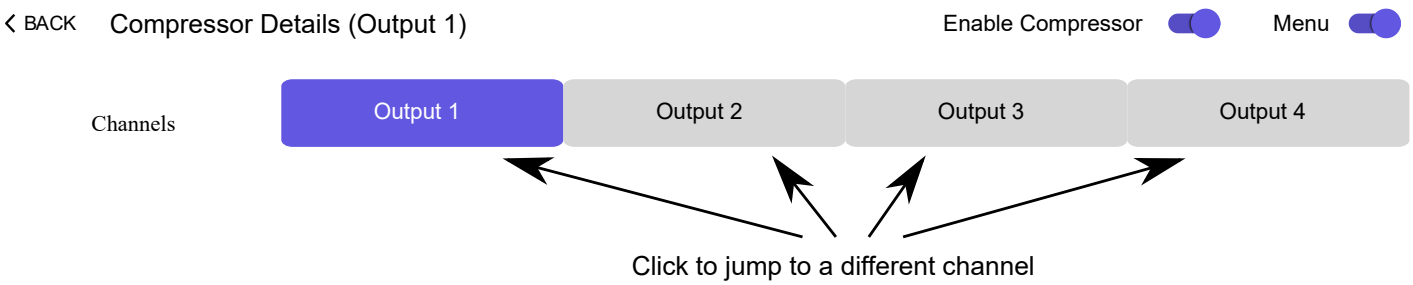
Parameters can be edited by:

1. Clicking and dragging on a slider. Once the focus is on a slider, you can also change the value with the left and right arrow keys on the keyboard.
2. Clicking in the value field and typing a new value. Once the focus is in a value field, you can also change the value with the up and down arrow keys on the keyboard.
3. Move the mouse cursor over the parameter and use the mouse scroll wheel or equivalent gesture on a trackpad.

The Tab key will move focus between fields; Shift-Tab will move in the opposite direction.

Jumping between channels

To jump quickly between the compressor window of different channels, enable the Menu switch at the top right. Jump to a different channel by clicking on the row of buttons:



On Inter-Sample Peaks

In digital audio, the term *inter-sample peak* is used to refer to clipping of a digital audio signal that can occur when:

1. The digital audio signal is scaled in amplitude without regard to the analog signal that it represents, **and**
2. That digital audio signal is converted to a different sample rate.

This page will explain what an inter-sample peak (ISP) is, how it occurs, and how to handle them in the miniDSP SHD.

A brief explanation of ISPs

Figure 1 shows an analog signal in blue and a possible digital sampling of it in red.

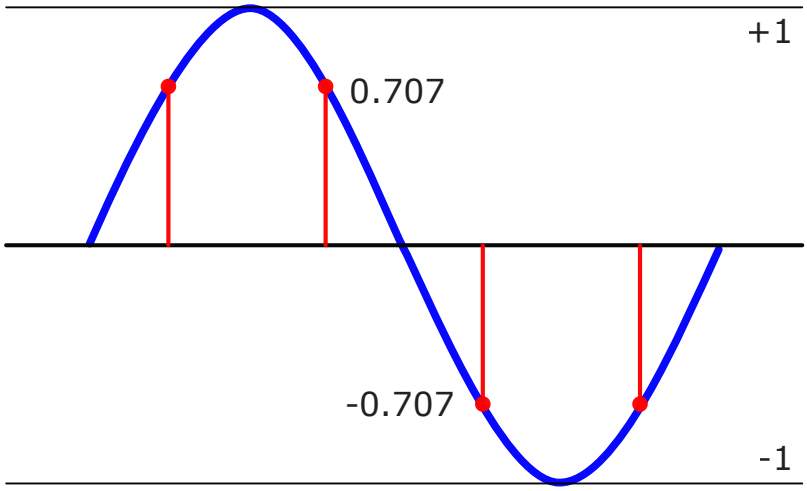


Figure 1

This artificial signal won't occur in real music but it's useful to explain the concept. If the sample rate is 44.1 kHz, the figure shows one cycle of an 11.025 kHz sine wave. The maximum allowable levels of the digital signal are +1 and -1, and the digital samples have the value 0.707 or -0.707.

In digital music production, it's common to try and maximize the digital signal level. If this is done in a simple manner with the signal shown above, the result is as shown in Figure 2.

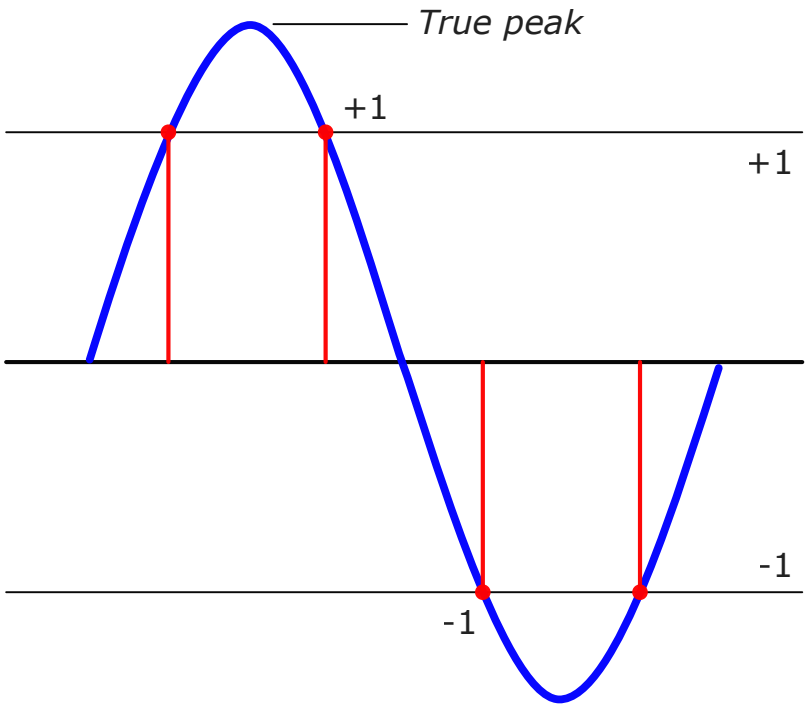


Figure 2

Each sample has been scaled up to have a value of +1 or -1. They are still within the digital range. However, the analog signal that this digital stream now represents has sections that exceed the +/-1 limit. The peaks in this underlying analog signal are referred to as the *true peaks*. The true peak is marked in Figure 2. For a more detailed discussion, see the BBC Whitepaper Terminology for Loudness and Level dBTP, LU and all that (https://www.bbc.co.uk/rd/publications/whitepaper202) .

If this digital signal is then converted to a different sample rate, some of the new samples will be over the digital limit. This is illustrated in Figure 3.

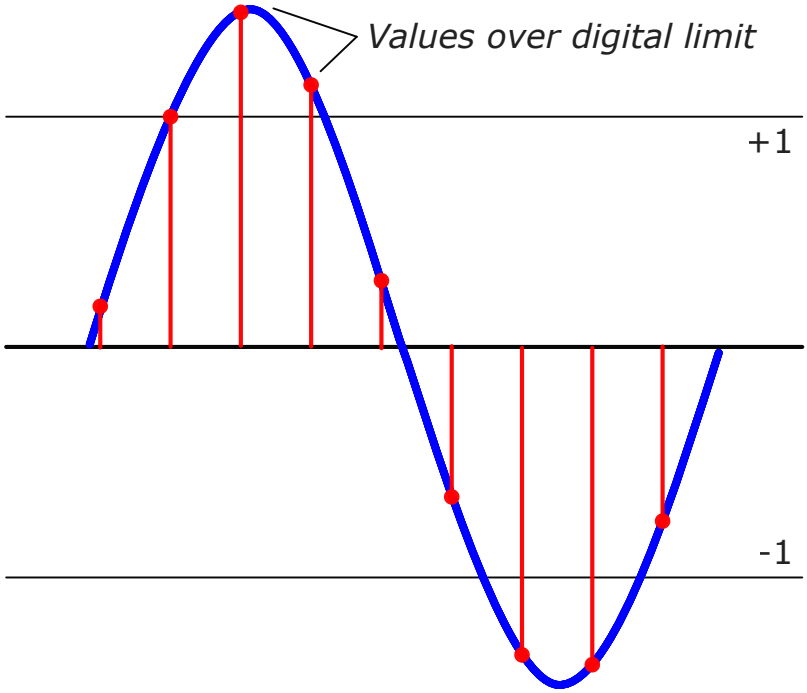


Figure 3

Since they are over the digital limit, however, they cannot be represented correctly and will **clip**. The signal we end up with is shown in Figure 4, which has a lot of distortion.

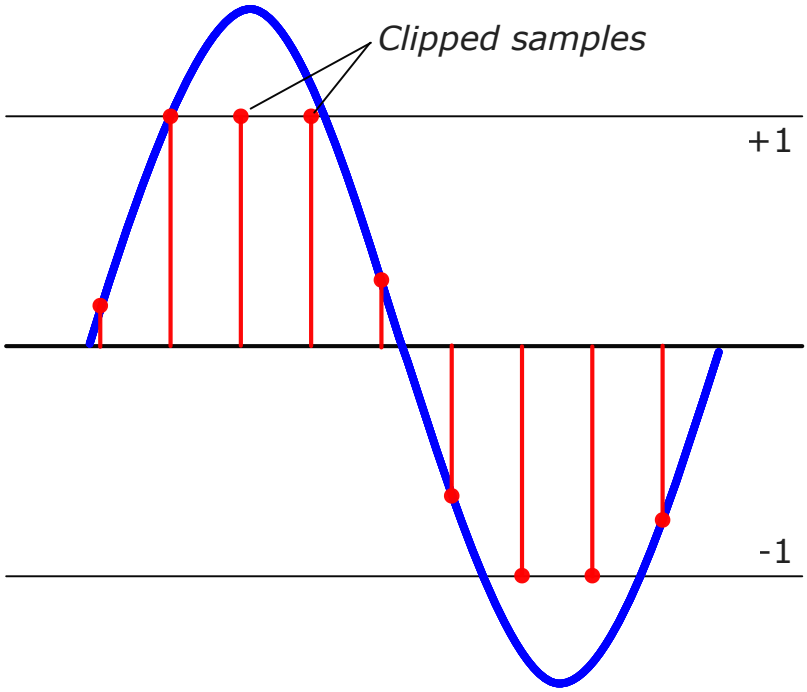


Figure 4

The clipped samples in Figure 4 are referred to as *inter-sample peaks*. (The term is not quite accurate, but we use it as it's commonly used for this phenomenon. By convention, *true peak* is the actual peak value of the underlying analog waveform, and *inter-sample peaks* are the sample that exceed the digital limit after sample-rate conversion and are therefore clipped.) ISP's are also called "inter-sample overs."

ISPs with music signals

While the previous section used an artificial signal to illustrate the concept of ISPs, they also occur with music signals. The amount by which the true peaks of a music signal exceed the digital maximum depends on the music and the way that it was processed digitally. For example, the author of the web page What are inter-sample peaks and true peaks? (https://splice.com/blog/what-are-inter-sample-peaks/) has measured true peaks up to 2.4 dB over the digital limit.

It's possible that clipped inter-sample peaks are less of an issue with modern recordings, due to increased awareness of the issue in music production and greater availability of production tools that are able to measure the true peak of a digital audio track.

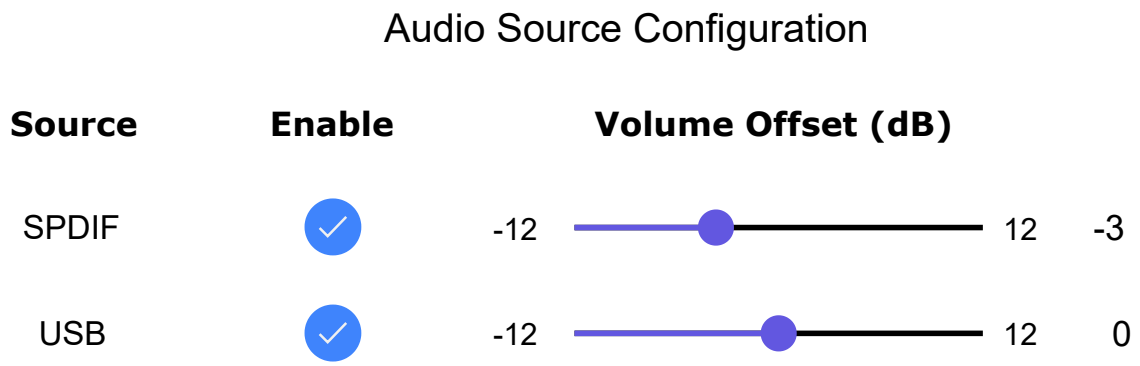
It's also worth also noting that most streaming services require that music uploaded to them has a maximum true peak of -1 or -2 dB. (The 1 or 2 dB headroom is to allow for errors when the music is streamed via a lossy encoding process.) The web page Mastering for Streaming: Platform Loudness and Normalization Explained (https://www.sageaudio.com/articles/mastering-for-streaming-platform-loudness-and-normalization-explained) , for example, lists the maximum allowed true peak – shown as e.g. -1 dBTP – of several services.

How to handle ISPs

As explained above, ISPs become an issue when the sample rate of a full-scale digital audio signal is changed. Most modern DAC chips oversample their incoming audio stream, and are thus susceptible to distortion from ISPs.

In the miniDSP SHD, while the internal digital processing uses floating-point arithmetic and is therefore not subject to the digital limit until the output to the DAC, it also has an integer-based asynchronous sample rate convertor (ASRC) at the *input* stage.

Our solution to ISPs in the SHD is to allow the user to reduce the level of the digital signal *before* it enters the ASRC. This is accomplished by setting the input volume offset of specific inputs to a negative value. A value of -2 to -4 dB is all that is needed:



Note that this measure is needed *only* if the digital signal is likely to contain ISPs. The most likely culprit is digital audio originating from a CD or file. As noted above, audio from streaming services is much less likely to have ISPs.

Note also that, if you play music from digital audio files and you use the audio *player* to control volume before the signal reaches the SHD, then in most cases you have already removed ISPs by reducing the level of the digital signal.

Finally, analog inputs never need a negative volume offset, as they are sampled at the internal sample rate of the SHD and there is no sample rate conversion. (In fact, they often benefit from some *positive* volume offset, to even out the subjective loudness of different inputs.)

Dirac Live

Dirac Live

The miniDSP SHD implements **stereo** Dirac Live correction. That is, there are two channels of Dirac Live correction. After stereo Dirac Live correction, the audio signal is routed to the four output channels for processing such as parametric EQ and crossovers.

> **Info**
>
> Dirac Live requires a direct USB connection from your computer to the SHD. It cannot be used via the miniDSP Wi-DG (Wifi to USB bridge).

Dirac Live overview

Dirac Live uses from 9 to 17 measurements made at different locations in your listening room to calculate correction filters for your speakers (and integrated subwoofer if you have one). You will take these measurements using the miniDSP processor, the **Dirac Live** application running on your computer, and a miniDSP UMIK-1 or UMIK-2 measurement microphone.

> **Info**
>
> This software runs on **Windows 10 or later** and **macOS 11 Big Sur or later**. Other versions of Windows or macOS/OS X are not supported.

Install or upgrade Dirac Live

In addition to miniDSP Device Console, you will need to separately install the Dirac Live software from Dirac Research.

> **Tip**
>
> If you have previously installed Dirac Live, check that your installed version is up to date, especially if you run into issues. You can see the list of versions in the changelog (https://helpdesk.dirac.com/en/changelogs) .

Download the **Dirac Live** application for your platform from the Dirac Research download page (https://www.dirac.com/resources/downloads) . On macOS, double-click on the diraclive-latest.zip download if your browser did not unzip it.

Double-click on the downloaded installer to run it. It will be named **diraclive-latest.exe** on Windows and **DiracLive v3.x.y Setup Darwin** on macOS (the version number *x.y* will change as updates are issued). We strongly recommend that you accept the default installation settings.

Do not run the application from the installer, as it must be started with the **Start Calibration** button in Device Console.

Download your microphone calibration files

Each UMIK-1 and UMIK-2 measurement microphone is individually calibrated to ensure accuracy. To download the unique calibration files for your microphone, go to the UMIK-1 page (https://www.minidsp.com/products/acoustic-measurement/umik-1) or the UMIK-2 page (https://www.minidsp.com/products/acoustic-measurement/umik-2) . Enter your microphone's serial number. It is in the form xxx-yyyy and labelled on the microphone.

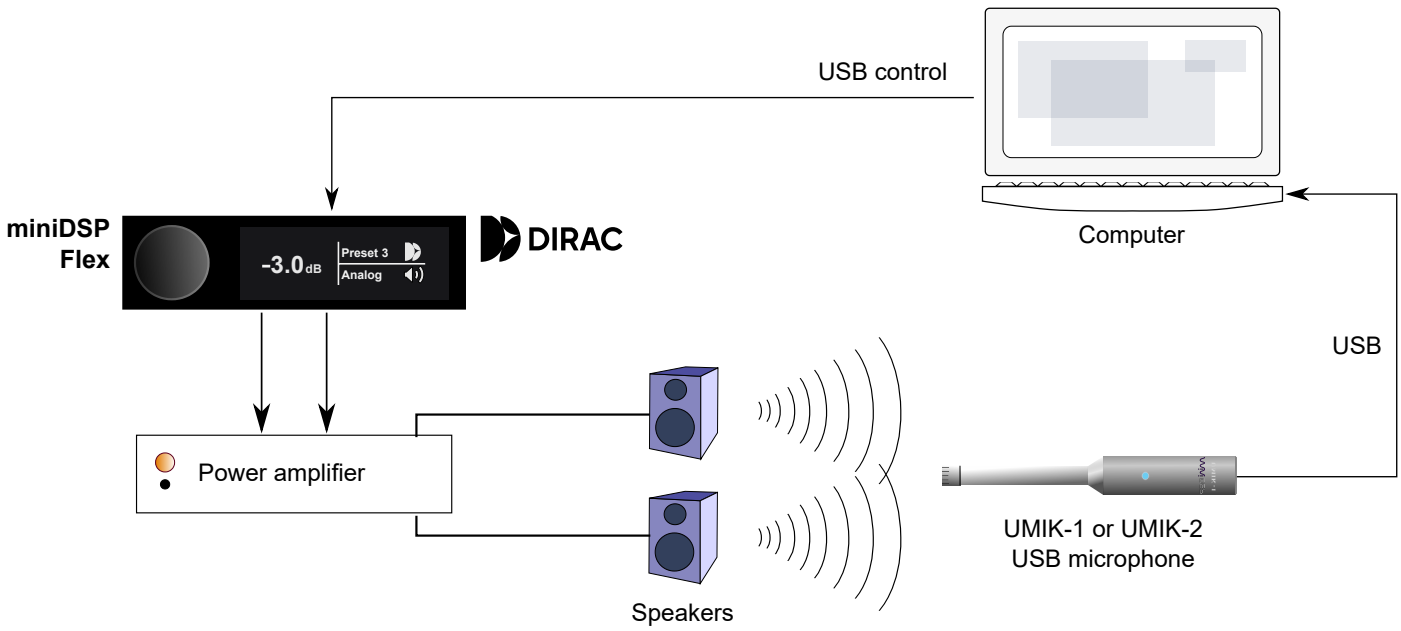
Two calibration files are downloaded:

- The regular or "on axis" calibration file will be saved to the computer with a name that is the same as the serial number e.g. "7001870.txt". This is the one that you should use when pointing the microphone towards the speakers.
- The second calibration file has "_90deg" in the name e.g. "7001870_90deg.txt." This corrects the frequency response when the microphone is oriented at 90 degrees to the sound source, such as when pointing the microphone towards the ceiling.

Connections for Dirac Live calibration

The diagram below shows typical connections for acoustic measurement with the Dirac Live application. Usually, you do not need to change any of the audio connections, as the Dirac Live test signals are generated inside the miniDSP processor.

1. Connect the supplied USB cable (type A to type B) from the miniDSP SHD to a USB port on the computer.
2. Connect the supplied USB cable (type A to mini type B or type C, depending on version) from the UMIK-1 or UMIK-2 to a USB port on the computer.



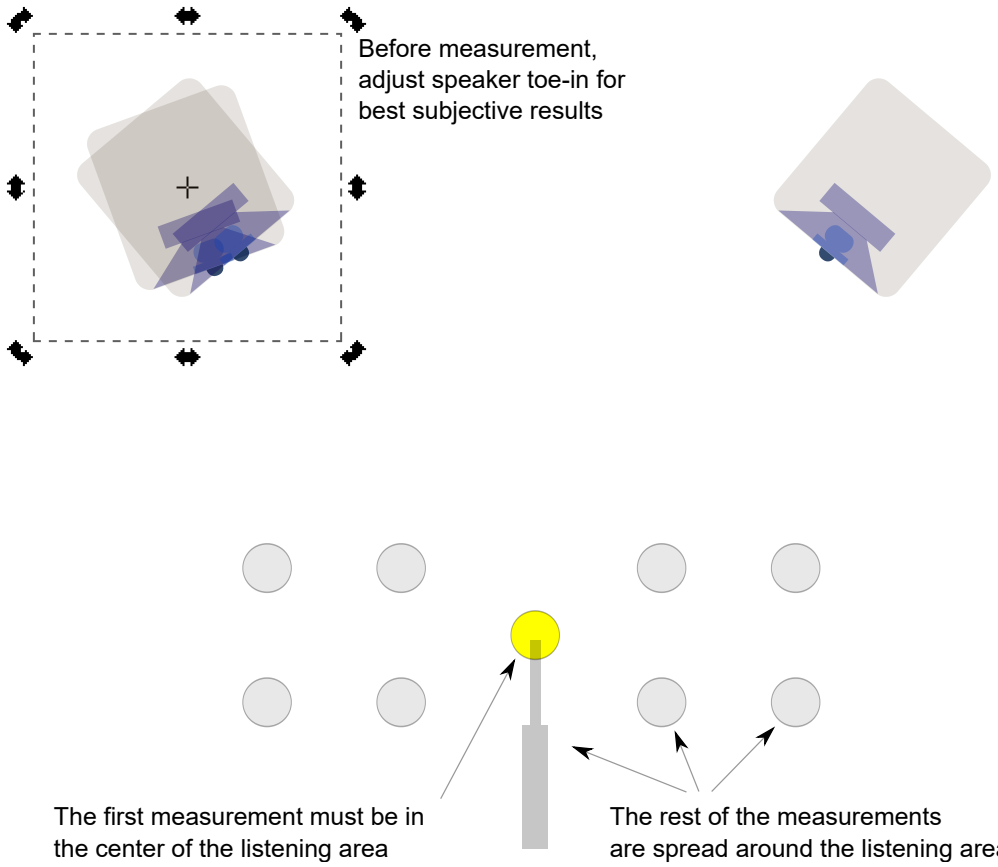
System connections for a stereo Dirac Live system

Place the UMIK-1 microphone into a microphone stand and position the computer and cabling so that there is enough freedom of movement to move the microphone into the needed locations. A small tripod stand is supplied with the UMIK-1, but a larger stand with boom arm can be used if desired. If necessary, a USB extension (up to a total USB cable length of 5 meters) can be used. In larger spaces, an active USB repeater may be needed.

- For stereo systems, we generally recommend that the microphone be pointed between the speakers and the "0 degree" calibration file used. However, many of our customers point the microphone at the ceiling and use the "90 degree" calibration file. Feel free to try it both ways.

Loudspeaker and microphone positioning

Prior to performing acoustic measurements, optimize your loudspeaker and listening positions. Start with the recommendations of the manufacturer of your loudspeakers. Loudspeakers designed for home hifi use typically perform best away from the walls, whereas speakers designed for studio use may be designed for use closer to walls or other surfaces. With Dirac Live, you have more freedom with loudspeaker placement, but the best result will still be achieved if optimal loudspeaker placement is used together with Dirac Live.



Speaker and microphone positioning for stereo Dirac Live

You should also experiment with toe-in – many loudspeakers benefit from pointing directly at the listening position or even slightly in front. The listening position should be away from the rear wall, as placing the listening chair or sofa right against the wall will result in increased early reflections and changes in timbre.

The first measurement must be taken at the **exact center** of the listening area, so that Dirac Live can set the levels and delays of each speaker. While this will usually place the microphone an equal distance from both speakers, Dirac Live will adjust in cases where it is not. Additional measurements are taken at other positions around the listening area and at different heights from the floor. All measurement positions should have acoustic "line of sight" – that is, the direct signal from the speaker to the microphone should not be obstructed by furniture or other objects.

Check your preset

If you have used the miniDSP Device Console to set up routing, crossovers or parametric EQ on the output channels, check that you have the correct preset selected before starting Dirac Live. This is because the Dirac Live test signal originates in the Dirac Live blocks and therefore passes through the routing matrix and the output channel processing. Refer to the diagram in the Signal Flow Overview page to refresh your memory if needed.

For example, suppose that you have set up preset 2 with routing and crossovers for a subwoofer. Before starting Dirac Live with the **START CALIBRATION** button, select preset 2 from within the miniDSP Device Console or with the remote control.

Windows

Double-check the following items *before* starting the Dirac Live application.

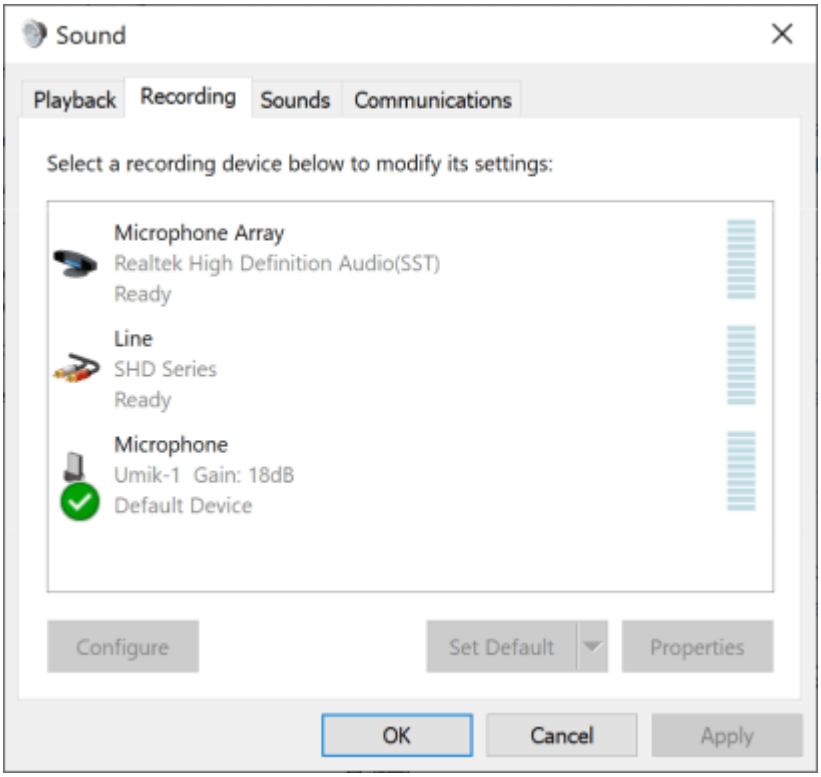
UMIK-1 plugged in

If you haven't plugged in your UMIK-1 yet, plug it in now.

> **Tip**
>
> Be sure to plug in the UMIK-1 **before** starting Dirac Live.

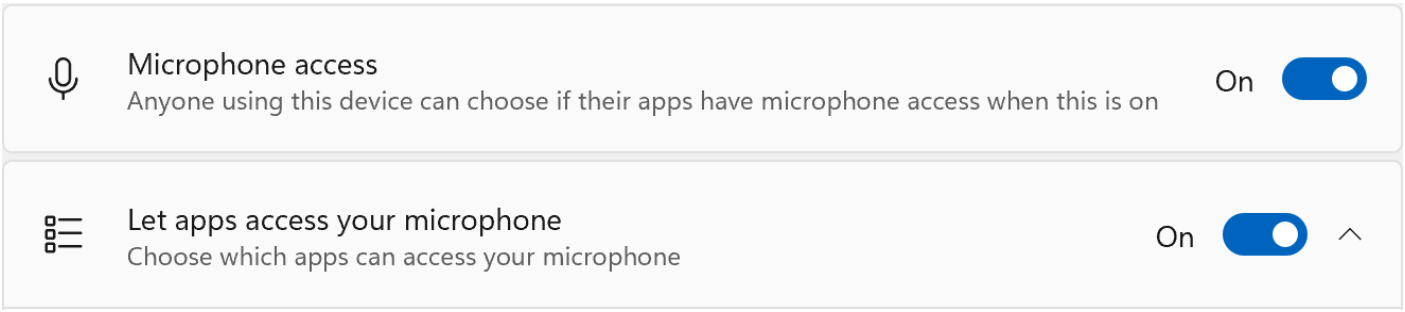
Check that UMIK-1 is set as the default recording device

Open the Windows Control Panel and select the Sound pane then the Recording tab. Check that the UMIK-1 is set as the default recording device. If it is not, then click on it and then on the Set Default button.

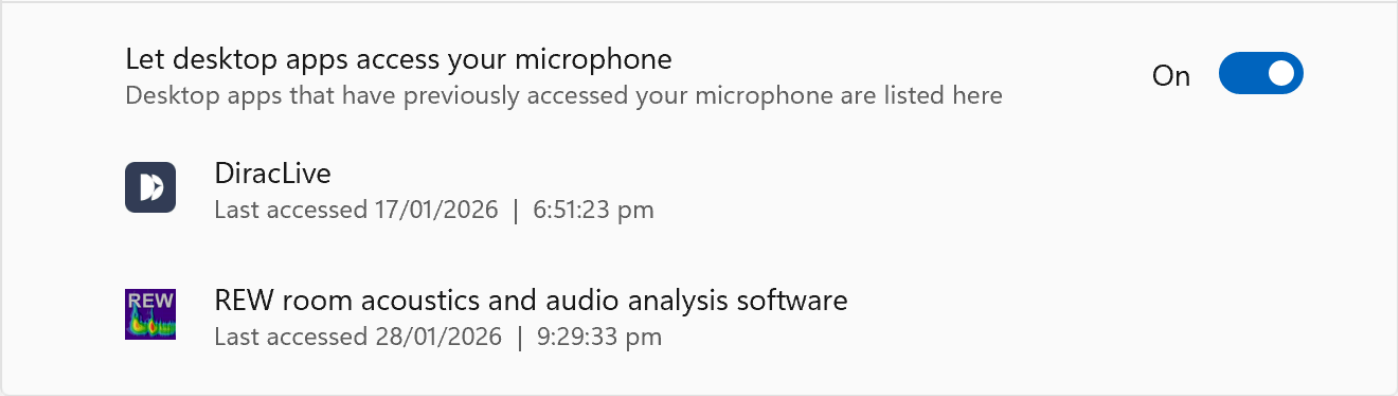


Dirac Live has access to the microphone

Open the Windows Settings and select Privacy & security, then scroll down and select Microphone. Check that "Microphone access" and "Let apps access your microphone" is turned on.



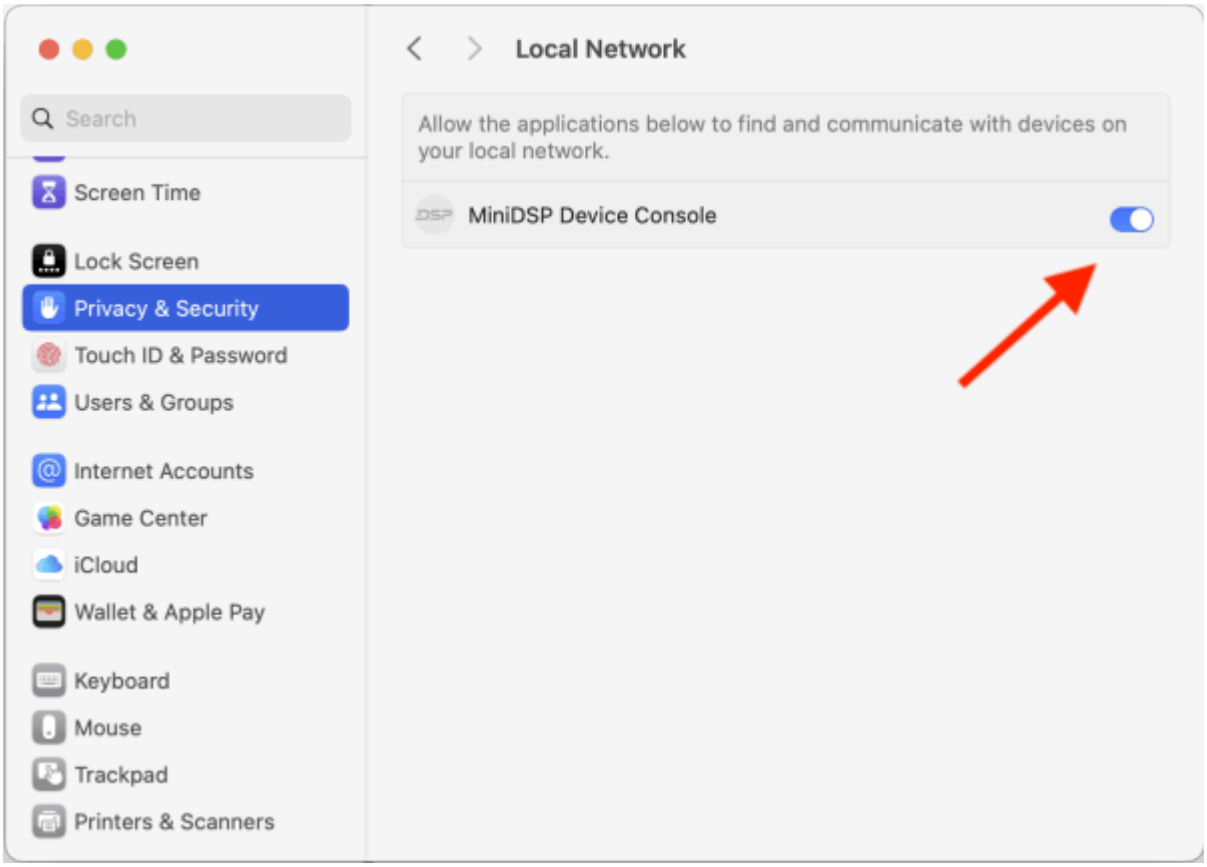
Scroll down and check that "Let desktop apps access your microphone" is also turned on, and that DiracLive is listed in the applications that are allowed to access the microphone:



macOS users

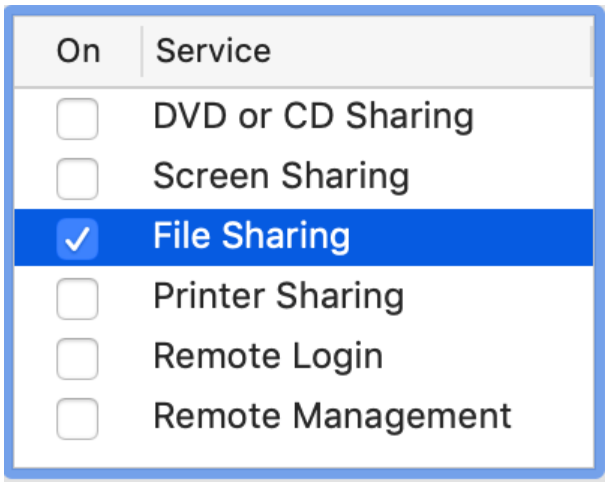
Enable local network access (macOS Sequoia and later)

Check that miniDSP Device Console is permitted local network access. Open System Settings, scroll down on the left sidebar and select **Privacy & Security**, then scroll down on the right and click on **Local Network**. If miniDSP Device Console is not enabled, enable it here:



Enable file sharing for device discovery

To enable device discovery, open System Preferences and then go to Sharing. Enable File Sharing as shown at right.



Notes:

a) This step is not always necessary and may depend on your Mac's configuration or home network setup.

b) You can turn File Sharing off again after you have completed your calibrations.

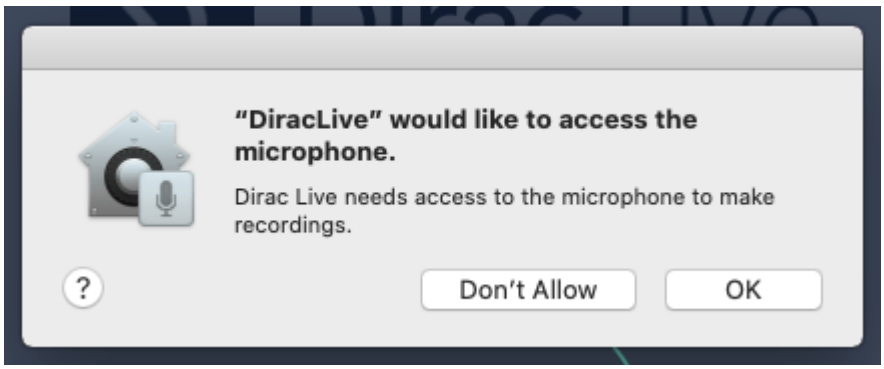
UMIK-1 plugged in

If you haven't plugged in your UMIK-1 yet, plug it in now.

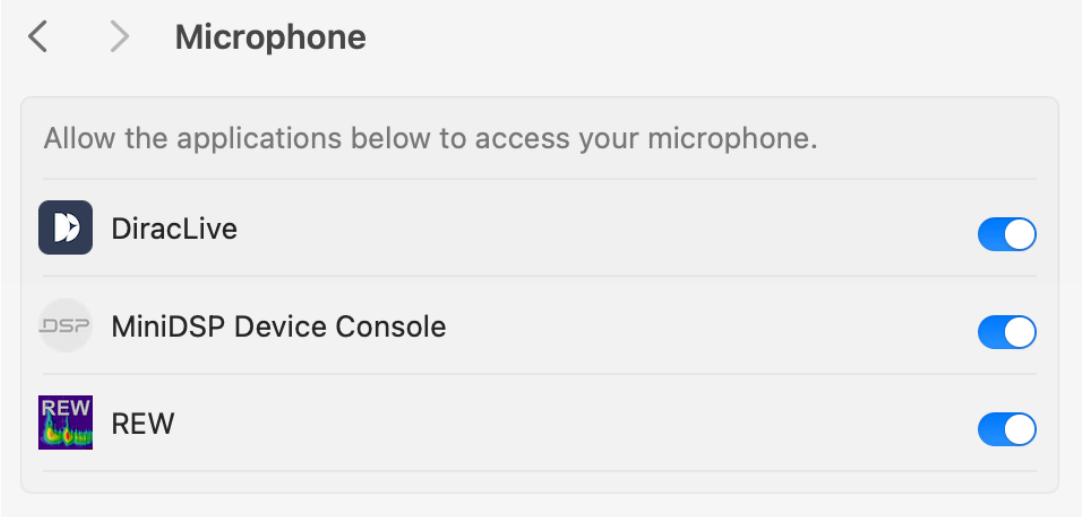
> **Tip**
>
> Be sure to plug in the UMIK-1 **before** starting Dirac Live.

Grant microphone access

The heightened security in recent versions of macOS can cause some difficulties with the Dirac Live application accessing the UMIK-1. The Dirac Live application should request microphone access when it first runs. A dialog like this will appear:



When it does, click **OK**. You can confirm that access has been granted by opening System Preferences, then going to the Privacy & Security pane, then scroll down and click on Microphone:



The application "Dirac Live" should appear here. You will typically have additional applications to which you have given microphone access.

First steps

Starting Dirac Live

To start Dirac Live calibration, click on the START CALIBRATION button:

The Device Console will disconnect and the Dirac Live application will start.

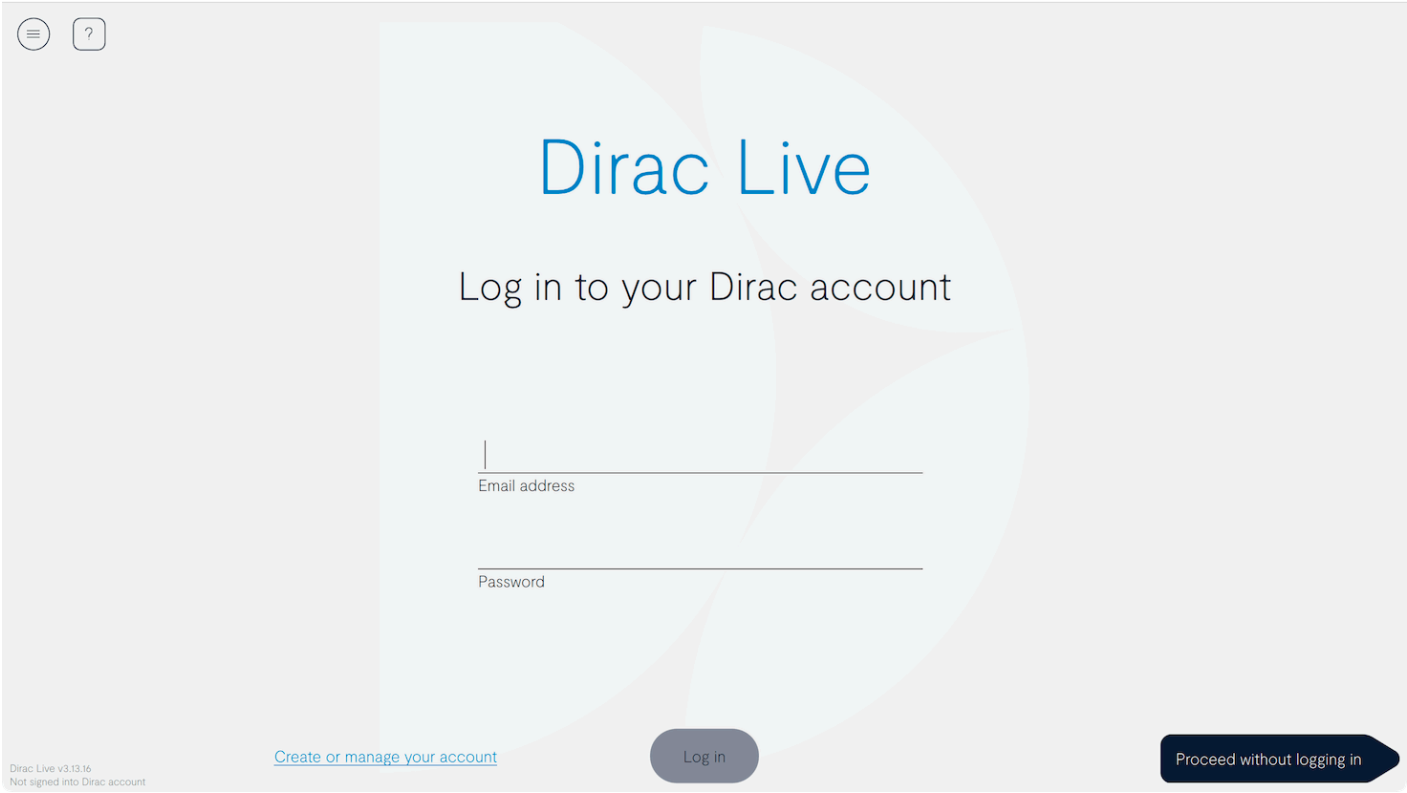
> **Info**
>
> Be sure to start the Dirac Live application from within the Device Console using the **START CALIBRATION** button. If you open the Dirac Live application by itself, it will not be able to detect the SHD.

> **Info**
>
> Dirac Live calibration **can not** be performed over the network, so the START CALIBRATION button will be visible only if the SHD is connected to the computer by USB.

> **Tip**
>
> Before starting Dirac Live, check that you have the correct preset selected on the SHD. (This applies only if you have changed the internal audio processing parameters with Device Console.)

Dirac account login or creation

The first time you start the Dirac Live application, the option to log in to or create a Dirac account appears:



Log in here if you have a Dirac account. If you do not have an account, you can create one by clicking on "Create or manage your account." This will direct you to the Dirac Live website.

> **Info**
>
> If you wish, you can click "Proceed without logging in" to perform a calibration. You can log in or create an account later by selecting **Disconnect and log in** from the hamburger menu.
>
> The following functions are enabled only if you are logged into your Dirac account:
>
> - Load a previously saved project. You can only load an existing project if you are logged into a Dirac account. If you don't log in, you will be able to save your measurements as a project, but you will not be able to open them again.
> - Other optional or paid-for features. miniDSP always provides the "full" version of Dirac Live with its products, so you do not need to log in to use the full version of Dirac Live if you have a miniDSP product.

Select device/zone

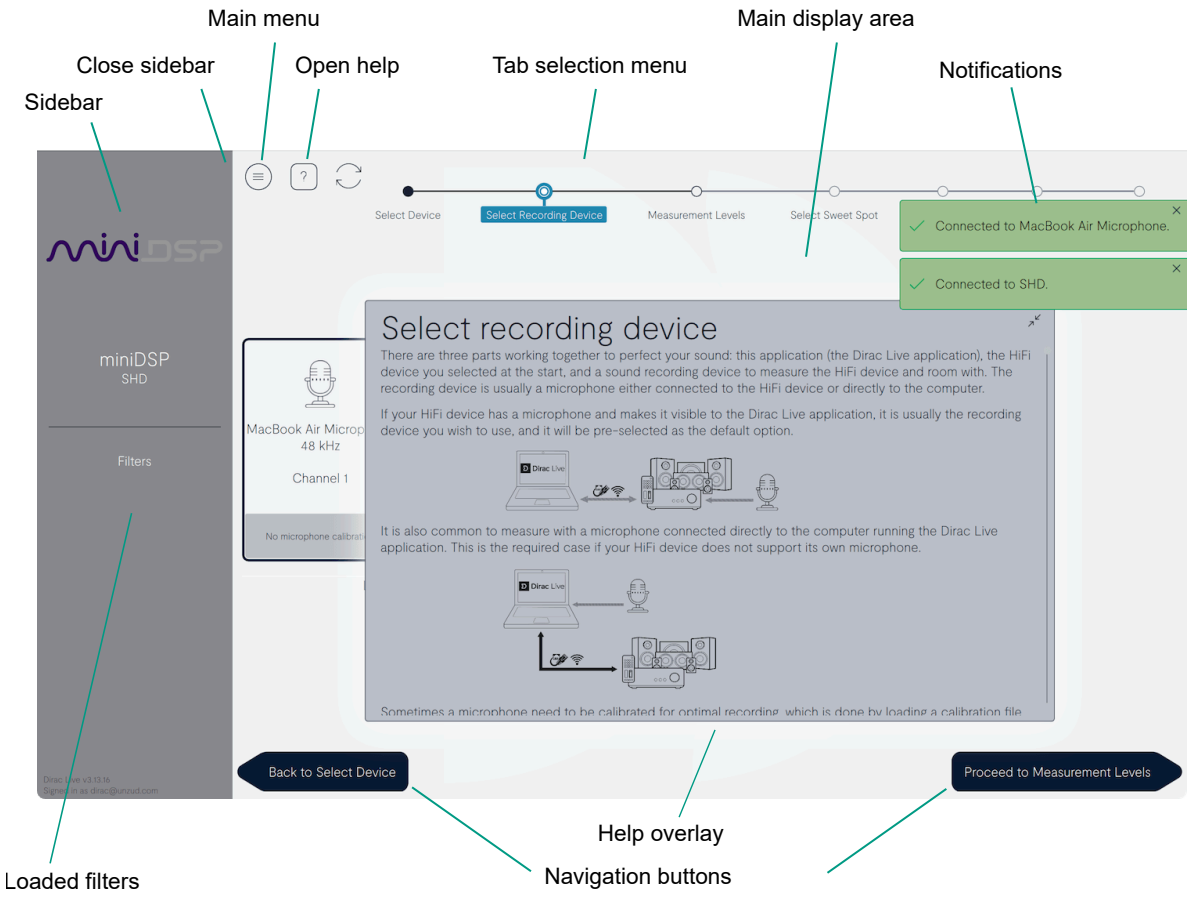
The only device visible here will be the miniDSP SHD. Click on the device icon to select it and proceed to the next tab.

(If necessary, close the help overlay that obscures the device icon.)

> **Tip**
>
> If Dirac Live doesn't find your device, see Dirac Live-related connectivity issues.

Features of the Dirac Live UI

Once you have selected the miniDSP SHD, the full Dirac Live UI becomes visible. This section describes the common features of the UI.



Sidebar

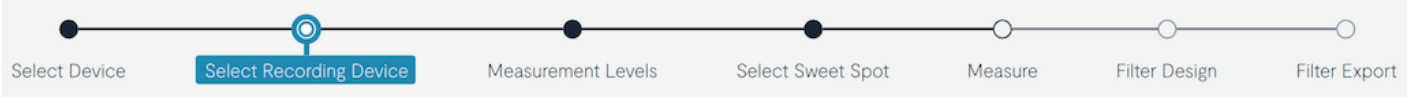
The sidebar shows the currently selected device. The lower portion lists loaded filters. The sidebar can be closed by hovering over the border with the main area, then clicking on the blue highlight that appears.

Loaded filters

After correction filters have been loaded into the miniDSP SHD, the list of loaded filters appears here.

Tab selection menu

Once the output device has been selected, the main tab menu appears. This menu indicates which tab you are currently viewing. Each tab has buttons to navigate to the previous and next tabs. You can also navigate directly to a tab by clicking on its name in the menu.



Main display area

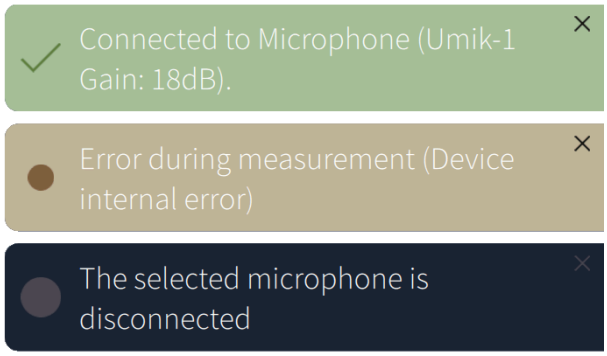
The Main display area contains the key information of each tab.

Main menu

The "hamburger" icon towards the top left drops down a menu with a number of useful items:

Notifications

When events happen, a notification appears to the top right of the window. Normal notifications are in green, with warnings and errors in black and orange:

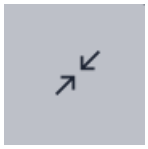


To close a notification, click on the "X" at its top right.

Help overlay

The help overlay appears on each tab the first time you open it. You can scroll to read all of it. Note that the recommendations in the Help overlay are generic -- that is, they do not necessarily apply to the specific device that you are using. For example, it may say "If your HiFi device has a microphone..." -- this does not apply to the miniDSP SHD.

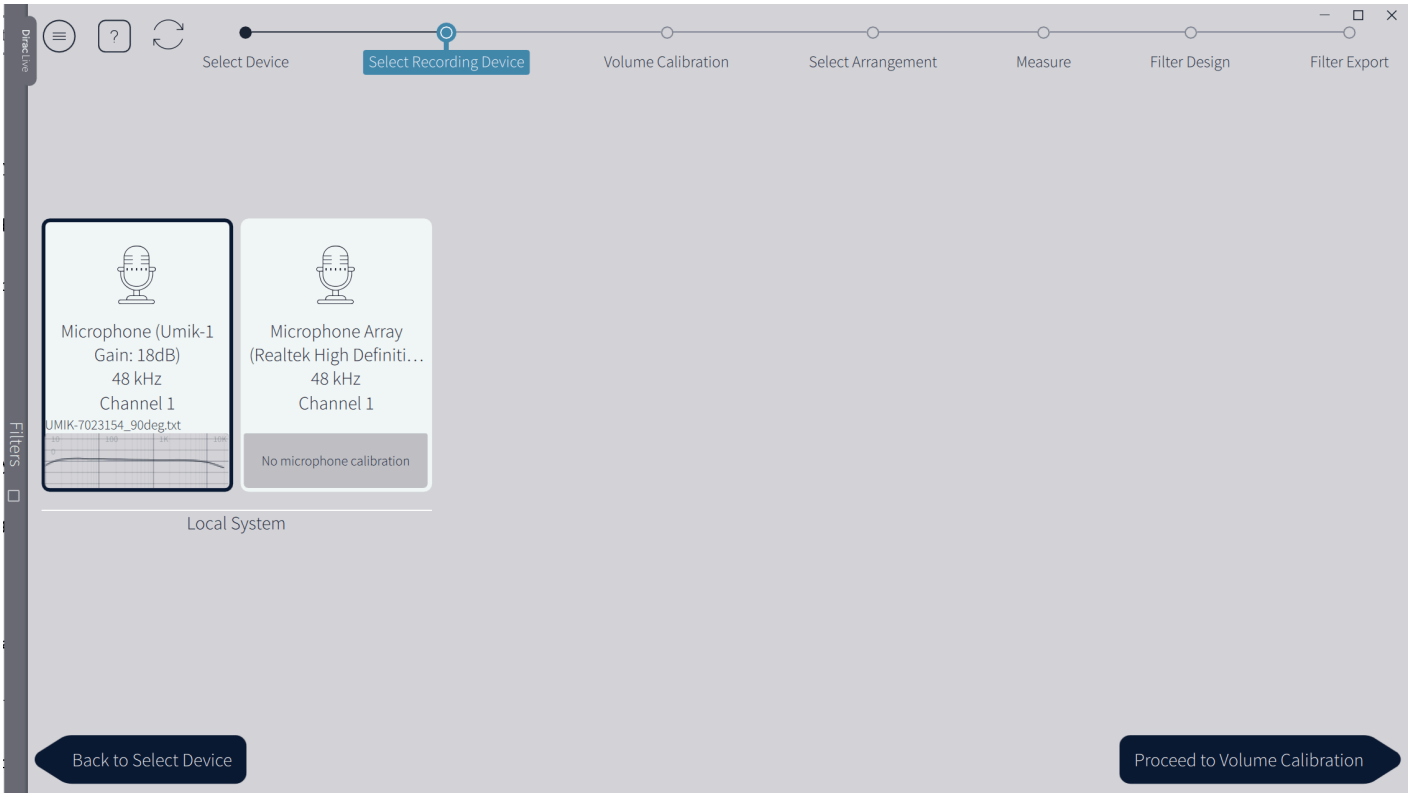
To close the overlay, click on the icon at its top right:



To open the help overlay again, click on the question mark icon:

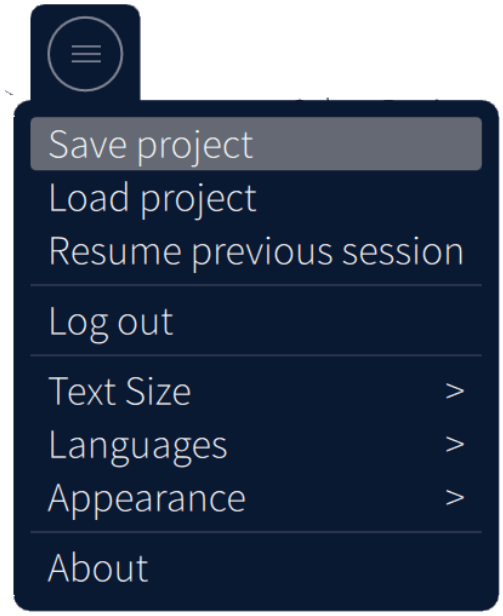
Navigation buttons

The navigation buttons to the lower left and lower right of the main display area link to the next and previous tab, using the order in which a complete calibration is normally performed.



Saving and loading projects

To save the project, click on the hamburger icon and select **Save project**.



To load the project, click on the hamburger icon and select **Load project**.

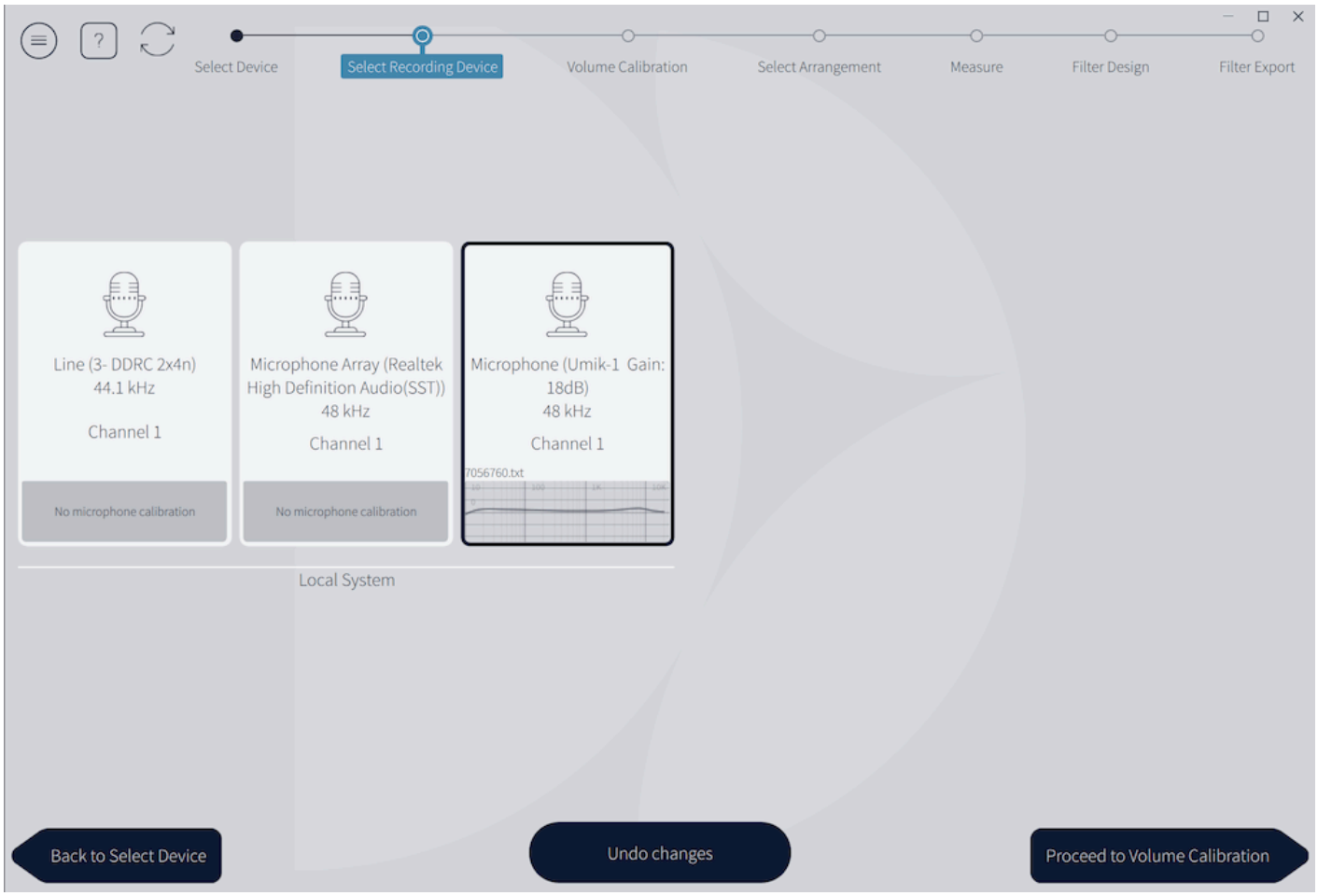
> **Info**
>
> If you save the project and you are not logged into your Dirac account, you may not be able to load that project again. Be sure to log into your Dirac account before saving the project.

Configure Dirac Live

Select Recording Device

Use this tab to select the UMIK-1 and load its calibration file:

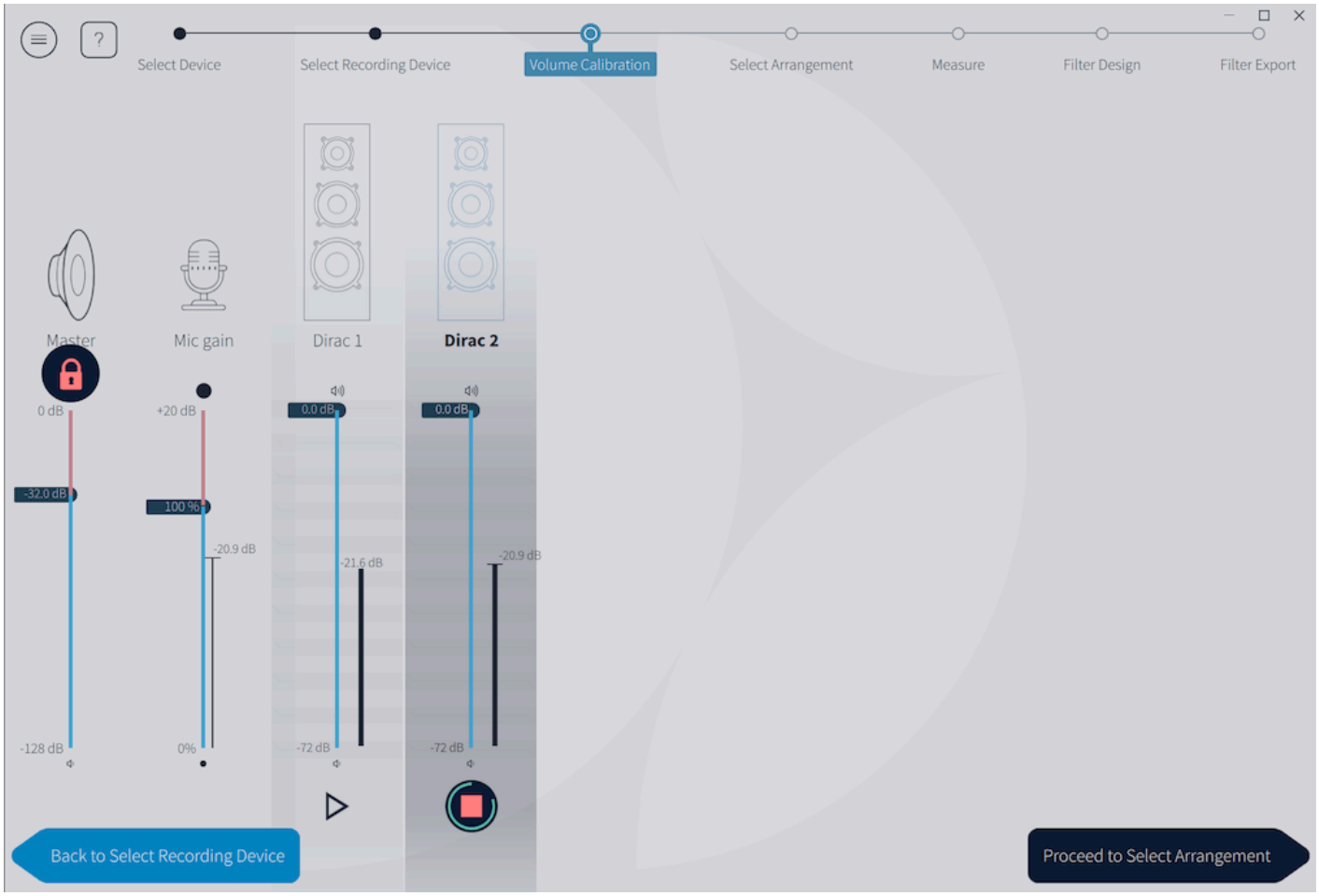
1. Click on the UMIK-1 microphone to select it. It will be labelled "Microphone (Umik-1 Gain: 18 dB)" or similar.
2. At the bottom of the grey rectangle, click on "No microphone calibration" and then "Load from file."
3. Locate your UMIK-1 calibration file in the file system and select it. The calibration file name and the calibration curve will then be displayed.



Once you have verified that this tab is correct, click the **Proceed to Measurement Levels** button.

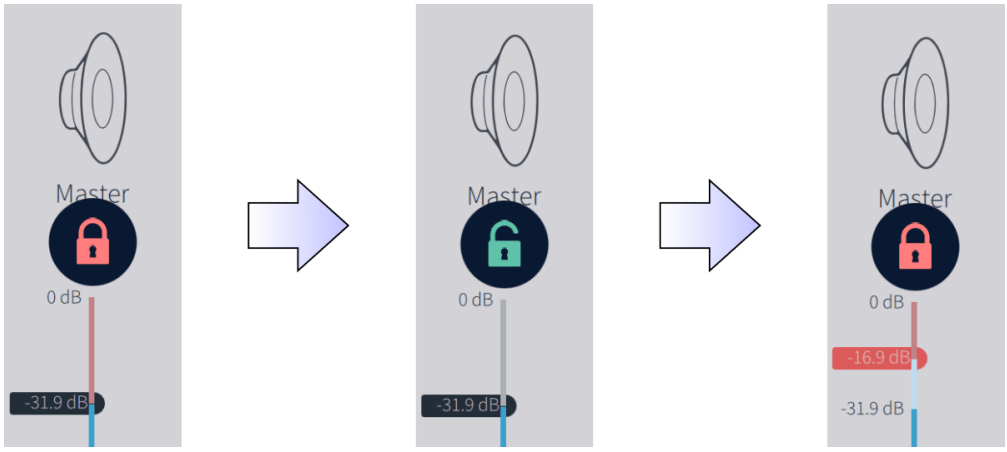
Measurement Levels

Use this tab to set the output level and microphone recording level. For best calibration results, ensure that the environment is reasonably quiet. Low frequency noise in particular can disrupt the calibration.



1. Check that the **Master output** slider is set low.
2. Click on the triangular button for the Dirac 1 channel and gradually increase the **Master output** slider. You should hear pink noise playing from the left front speaker. Continue to increase volume until it is at a moderate level, such that your voice would have to be raised to converse with someone sitting next to you.
3. Increase the **Mic gain** slider. Setting it so that the level meter reads between -20 and -30 dB will generally give good results.
4. Click on the triangular button for the Dirac 2 channel and confirm that the level is around the same as the first channel.

As a safety feature, output volume is limited to -32.0 dB. If you try to raise it higher, a lock icon will appear. To raise it higher, click the lock. It will "unlock" and then you can raise the slider further. The lock icon will automatically lock again after a few seconds.



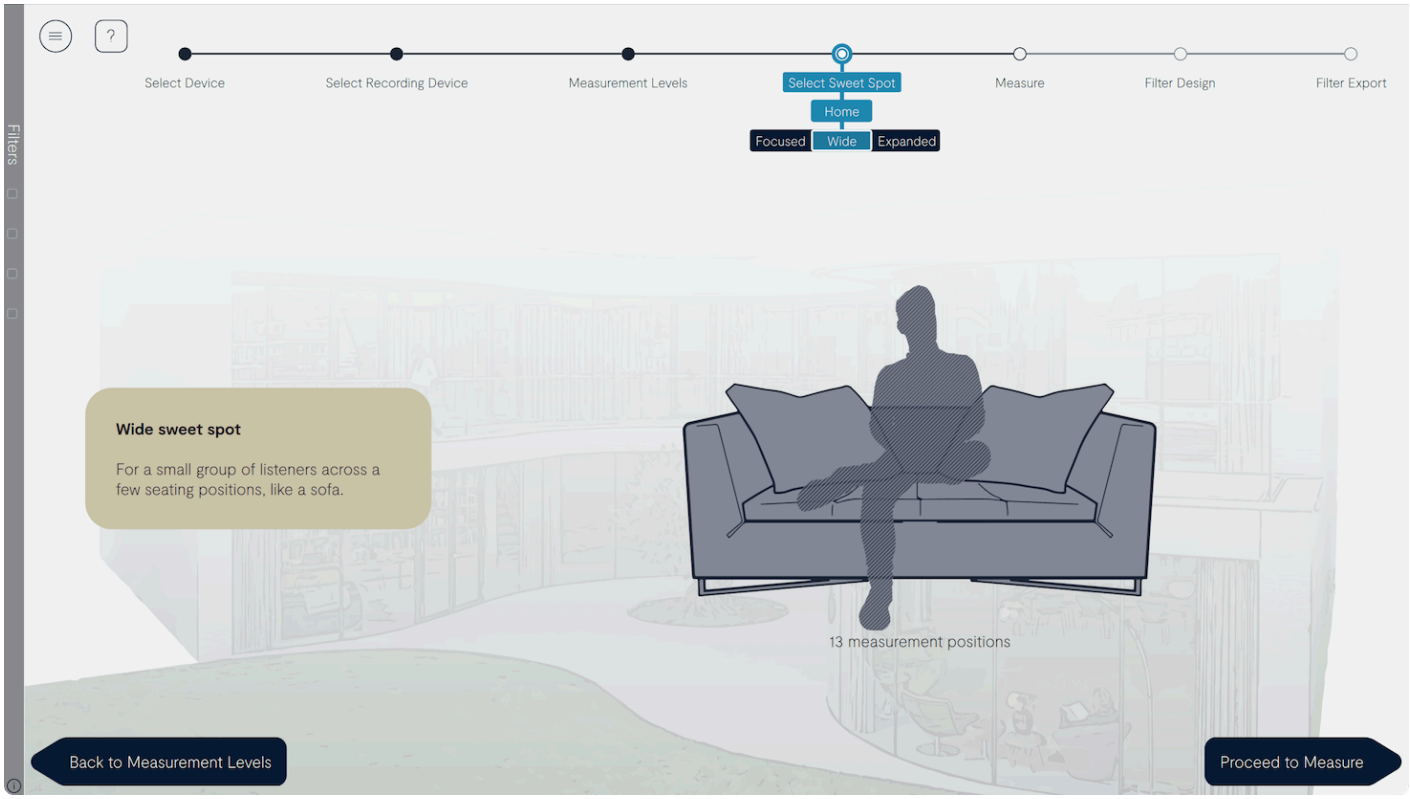
Once you have set the input and output levels, click the **Proceed to Select Sweet Spot** button.

> **Info**
>
> Note: there will be only two channels shown, even if you have used the Device Console to set up routing for a subwoofer. This is because the miniDSP SHD is a **stereo** Dirac Live processor. Therefore, it treats each speaker *combined with the subwoofer* as a single channel. There is no separate Dirac Live channel for the subwoofer.

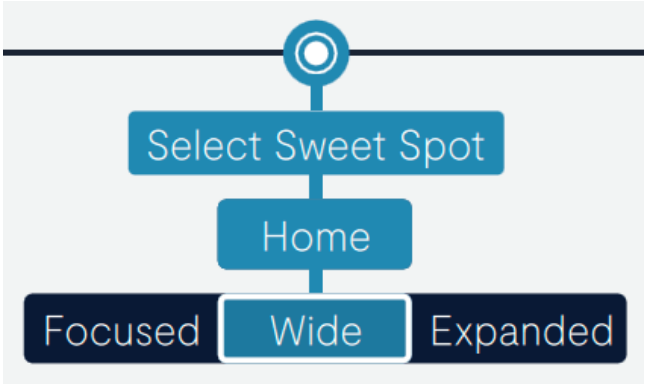
> **Tip**
>
> While the measurement technique used by Dirac Live is quite robust, low-frequency noise (traffic, HVAC, machinery, aircraft, storms) in particular can adversely affect measurement accuracy. A high level of ambient noise can degrade signal to noise ratio and prevent the algorithm from analyzing the test signal properly. Minimize the effect of any external noise, ensure that measurement signal levels are adequate, and/or choose a suitable time for performing measurements.

Select Sweet Spot

The **Select Sweet Spot** tab selects the type of seating arrangement to calibrate for. Each arrangement has a different number of measurement positions.



The menu bar shows the selection choices:



Use the menu to select the arrangement that is most appropriate for your listening area. They are described more below.

There are no hard and fast rules on which arrangement to use, so feel free to experiment by calibrating for more than one arrangement and auditioning the results. Up to four different sets of correction filters can be loaded into the miniDSP SHD.

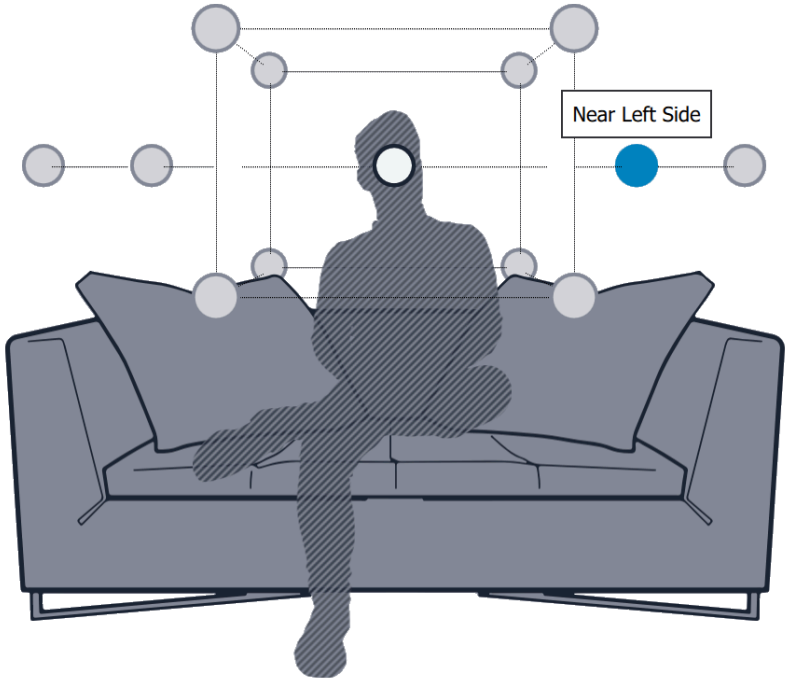
After selecting the seating arrangement, click on the **Proceed to Measure** button.

Focused

This arrangement is best for a single listener. There are nine measurement positions:

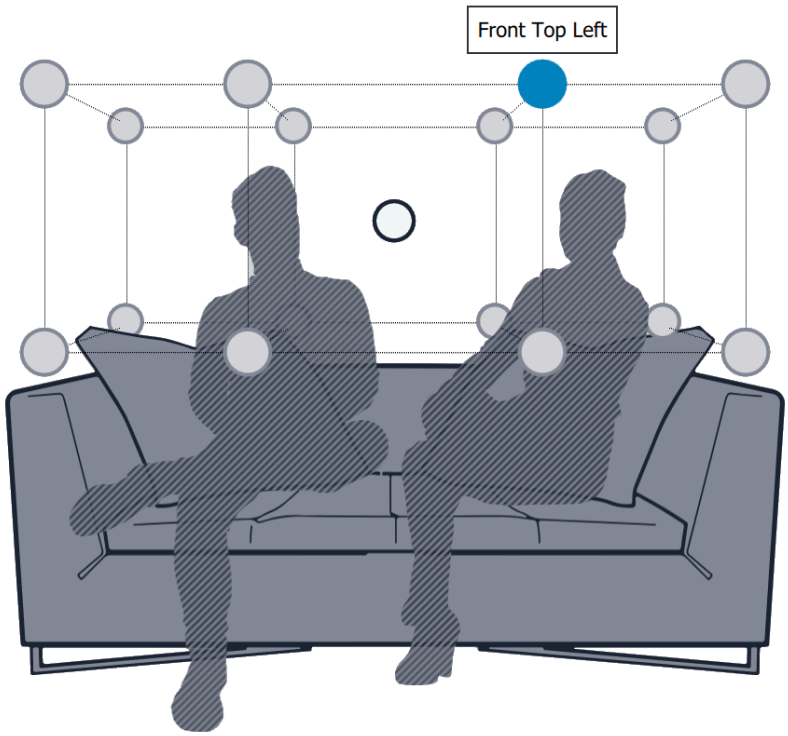
Wide

This arrangement is optimized for a single listener but also caters for additional listeners. There are thirteen measurement positions: the same nine as the tightly-focused arrangement, plus an additional four positions extending out to the left and right:



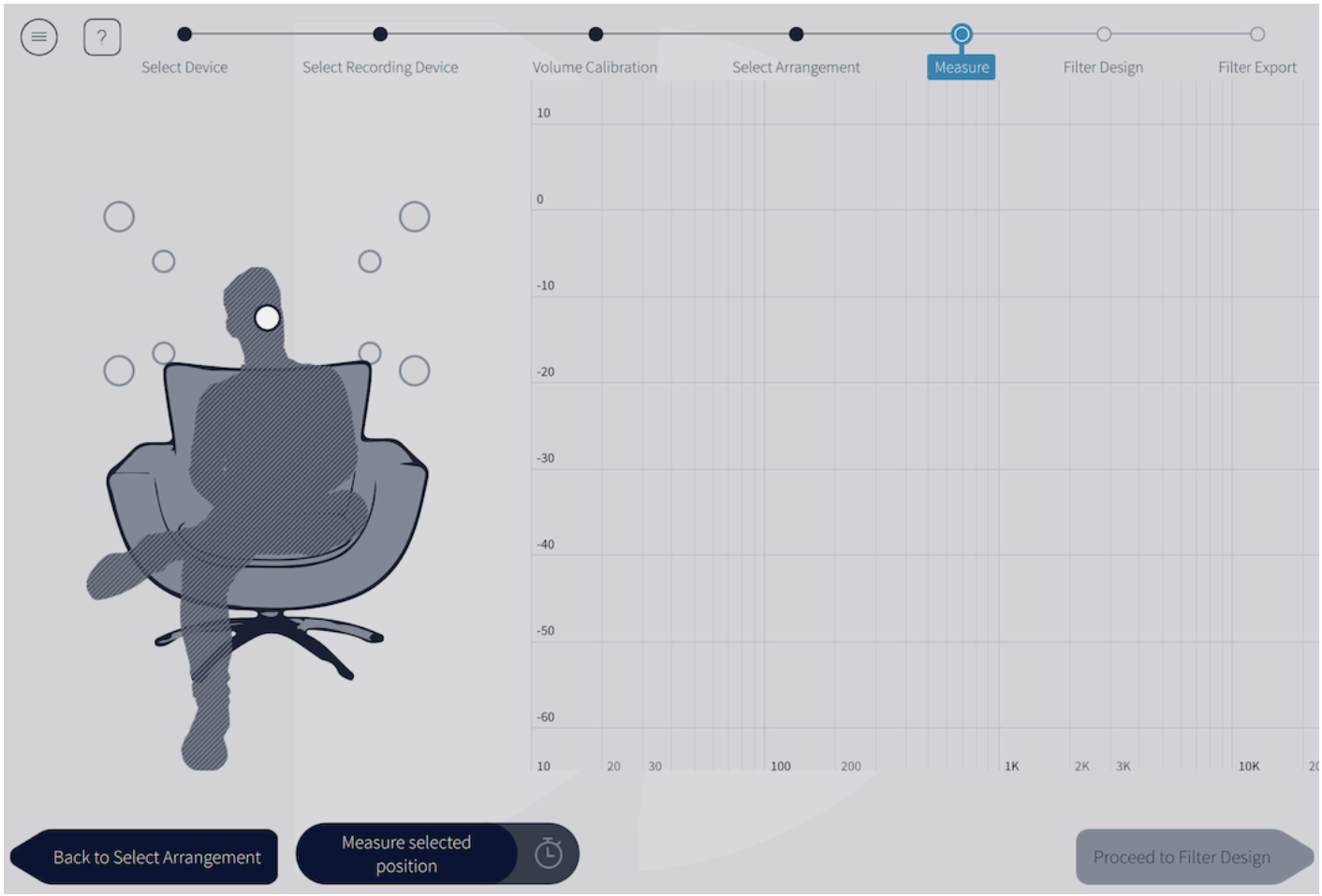
Expanded

This arrangement is optimized for multiple listeners. There are seventeen measurement positions: the same nine as the tightly-focused arrangement, plus an additional eight positions that extend the listening area out to the left and right:

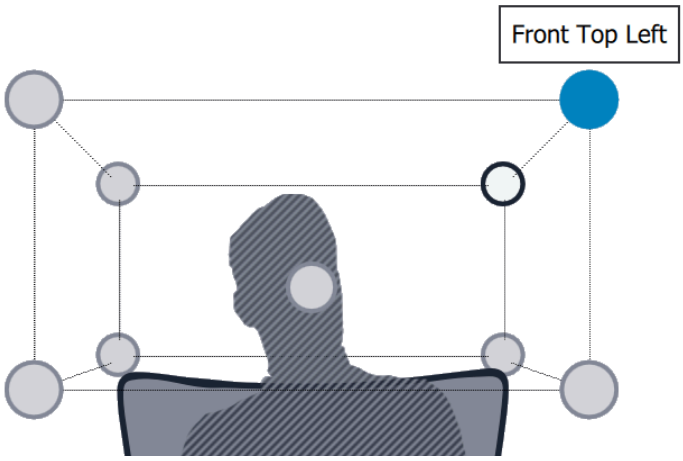


Take your measurements

Measurements are performed on the **Measure** tab.



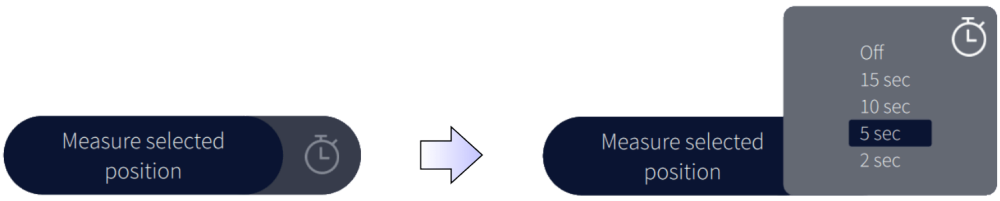
The left side of the window displays a visual guide to the measurement positions. The position that will be measured is shown in white. To display the name of a position, hover the mouse over it -- the position will be highlighted in blue and its name displayed. For example:



While the visual guide indicates a suitable set of microphone positions, these can be varied to suit individual circumstances. It is, however, important that the first measurement, named "Main Position." is taken in the center of the listening area, as this measurement is used to set the level and delay of each channel.

Run the first measurement

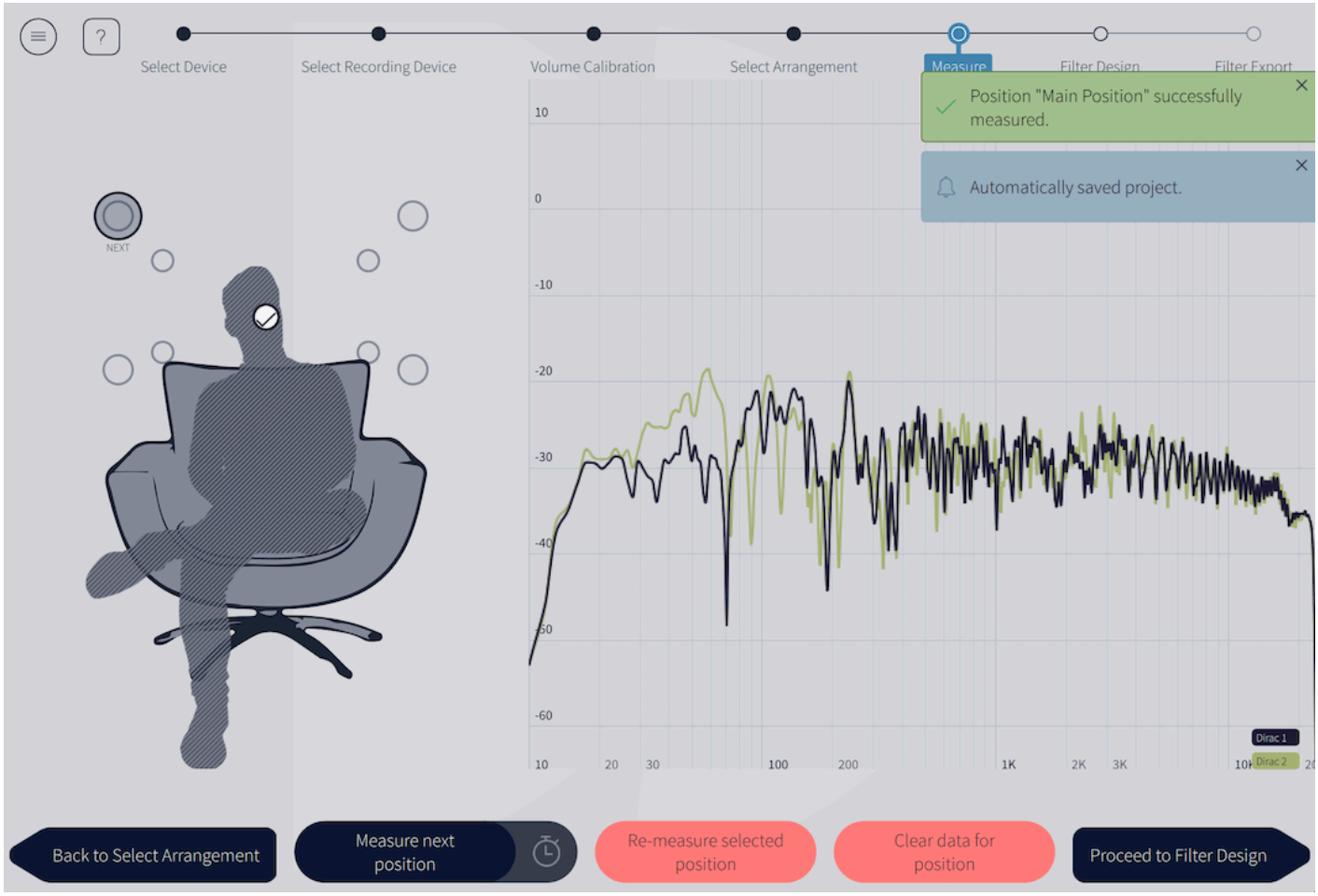
Prior to running the first measurement, you can optionally set a short delay before the measurement starts. To do so, click on the small clock icon on the right side of the **Measure selected position** button and choose the delay:



With the microphone in the center of the listening area, click on **Measure selected position**. The miniDSP SHD will generate a test signal, audible as a frequency sweep through the left speaker, then the right, then through the left again.

> **Warning**
>
> If your speaker sounds distorted or strained during the measurement, click **Abort this measurement** immediately. Go back to the Volume Calibration screen and lower the output volume.

On completion of a successful measurement, the window will update with a graph of the measured frequency response:



If the measurement is successful, a check mark will be shown on the visual guide and the next measurement position will be highlighted.

If the application indicates that the measurement was not successful, you will need to take corrective action. The most common errors are related to signal level:

- The measurement signal is too low to ensure a clean capture.
- The measurement signal is too high and the audio signal has exceeded the maximum level (clipping). This is shown in red on the time domain display.

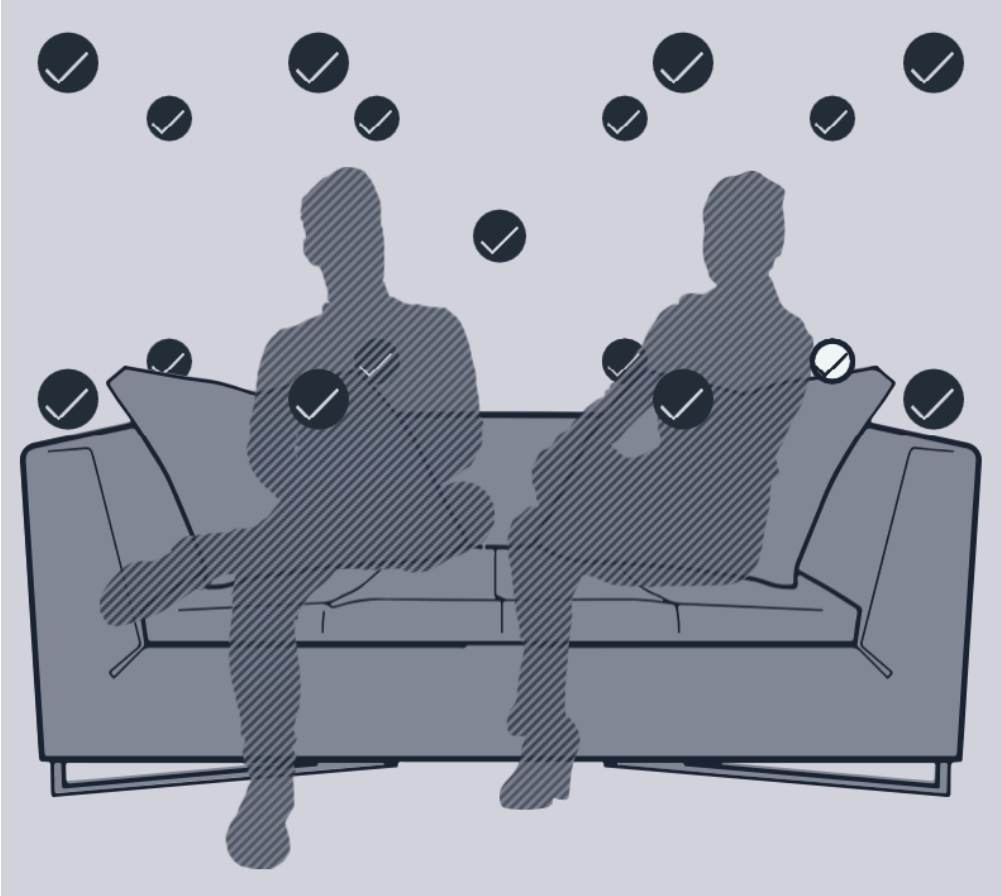
In either of the above cases, go back to the **Volume Calibration** tab and adjust **Master output** or **Mic gain**. Then re-run the measurement.

Completing the measurements

To take the next measurement, move the microphone to the highlighted location -- labeled "Next" on the seating visual -- then click on **Measure next position**.

If the measurement produces an error that the signal was too low or high, go back to the **Volume Calibration** tab and adjust **Master output** or **Mic gain**. Return to the Measure tab and then click on **Remeasure selected position**. You do not need to redo measurements that you have already successfully completed.

Repeat until all positions have a successful measurement:



Tip

The measurement positions should be well spread out over the entire listening area so that Dirac Live can acquire a good set of measurements that capture the acoustic behavior of the room. Typically, you should spread the microphone positions over a circle with a diameter of at least a meter (three feet) and vary the microphone height from the central position by at least 30 cm (one foot) up and down. Placing all measurement positions too close to each other may result in "over-correction" that will sound dry and dull.

A different set of measurement positions other than those indicated by the visual guide and the above guidelines can be used if necessary. For example, if the displayed measurement position doesn't provide acoustic "line of sight" from the speaker to the microphone, then adjust the measurement position so that it does. The important thing is to ensure that the measurement positions are spread out over the whole listening area and that the microphone is moved a sufficient distance vertically as well as horizontally.

In some cases, such as when the listening area is very close to the loudspeakers or the loudspeakers have a very narrow dispersion pattern, the size and in particular the height of the measurement area can be reduced, to avoid discrepancies caused by varying output response from the speakers themselves.

Viewing and redoing measurements

Click on any completed measurement position to select it and display its measured response.

After selecting a completed measurement, the two buttons at the bottom of the screen can be used to re-take the measurement or to delete it:

Once you have completed all measurements, click on the **Proceed to Filter Design** button.

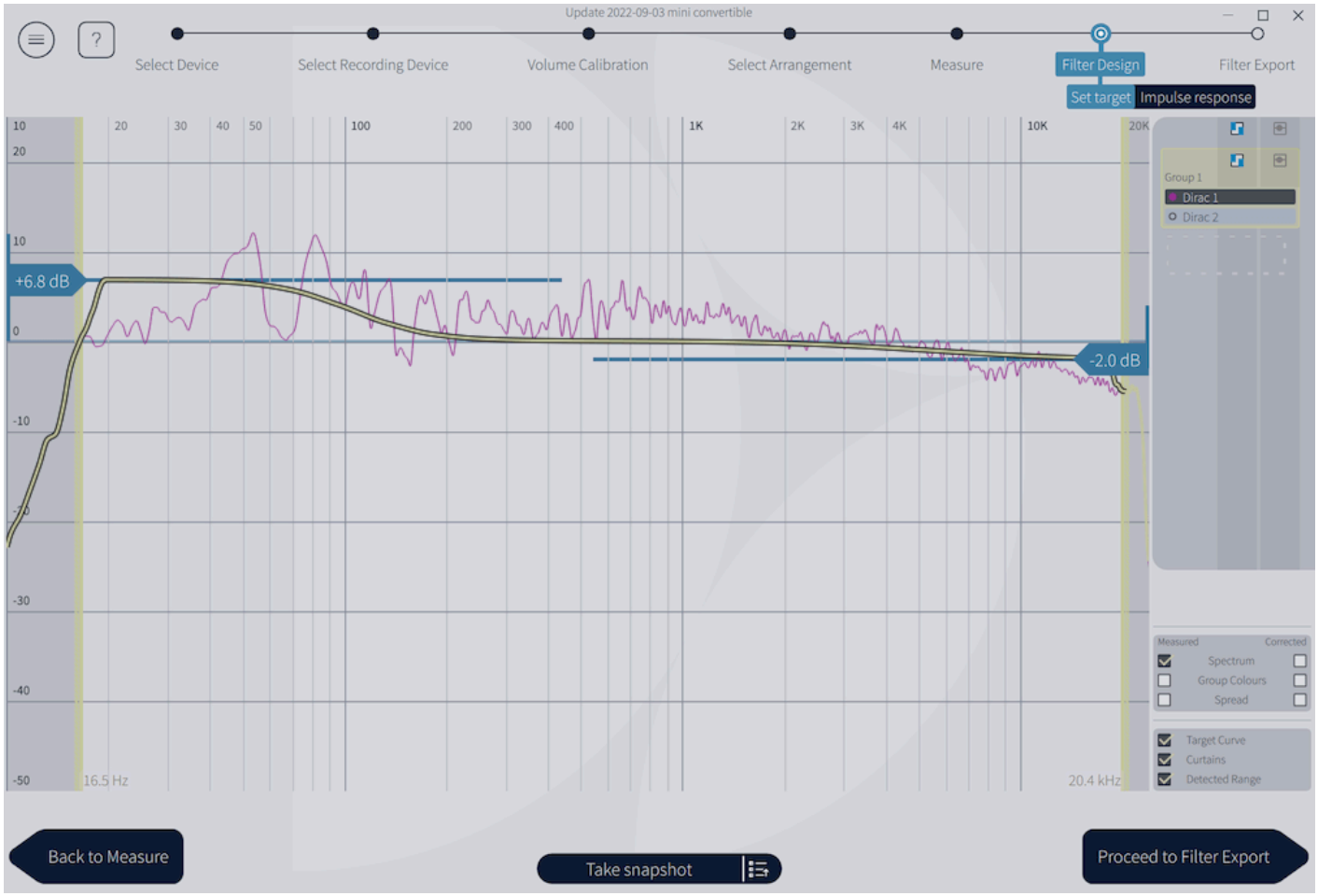
Filter design

The Filter Design screen

Once the full set of measurements has successfully been taken, **Dirac Live** has the acoustical information it needs about your loudspeakers and listening room to create the correction filters.

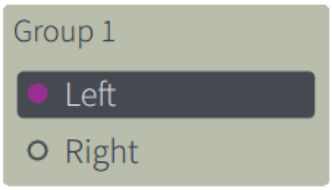
Frequency response display

The **Filter Design** tab shows the frequency response of one or two channels and the target curve. The following example shows the left channel in mauve and the default target in yellow/black:

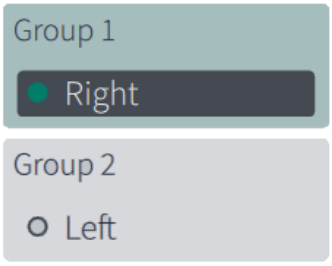


Groups

There are two channels listed towards the top right of the window, in a single group:



Each group has its own target curve and range curtains. If you wish to have different target curves for left and right, you can separate the two channels into separate groups. To do this, click on "Left" or "Right" and drag it out of the darker box. There will then be two groups, each with its own target curve:



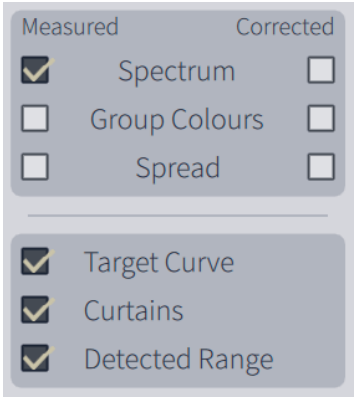
Range curtains

The grey regions to the left and right of the graph are excluded from magnitude correction. You can adjust the frequency range of correction by dragging the "curtains" to either side of the graph. By default, Dirac Live sets the range curtains to the detected range of both speakers.

- Avoid setting the low frequency curtain too low, as this can result in excessive boost and increase distortion.
- The high frequency curtain can be set where you like. We recommend trying a full-range correction for at least one of your profiles. Or, if you are happy with the inherent in-room response at higher frequencies, try setting the upper curtain to limit correction to the modal region (up to 300 Hz, in a typical room).

Display controls

There are several controls at the right of the graph:



Spectrum

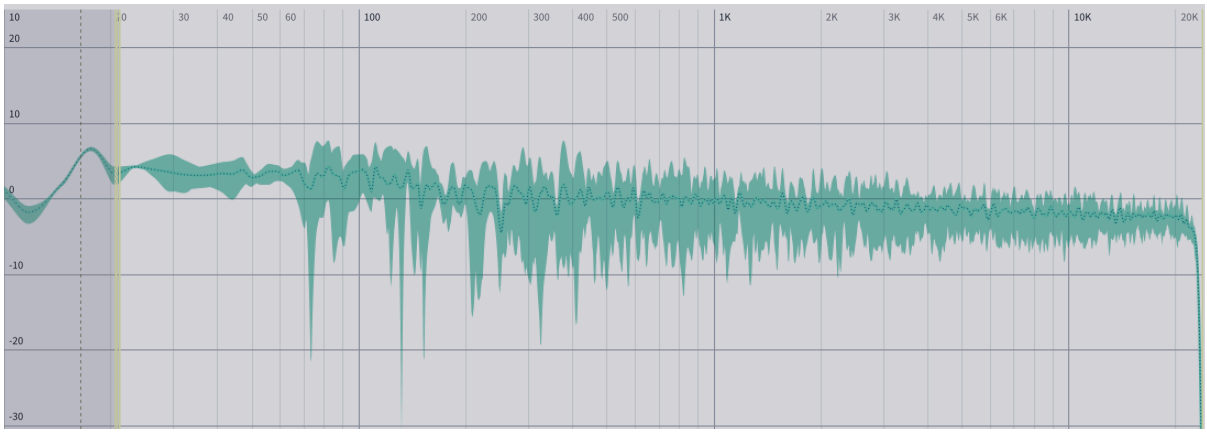
Display the average of all magnitude responses. If the "Measured" checkbox on the left is on, the average of the uncorrected measurements is displayed. If the "Corrected" checkbox on the right is on, the average of the response after correction is displayed.

Group colors

If checked, the graph colors are the same for all channels in a group. This can be individually selected for the measured and corrected responses.

Spread

Display the responses at all measurement locations as a lighter highlight on the graph. This can be individually selected for the measured and corrected responses. This example shows the spread of responses after correction:



Target curve

Display the target curve for the current group or groups.

Curtains

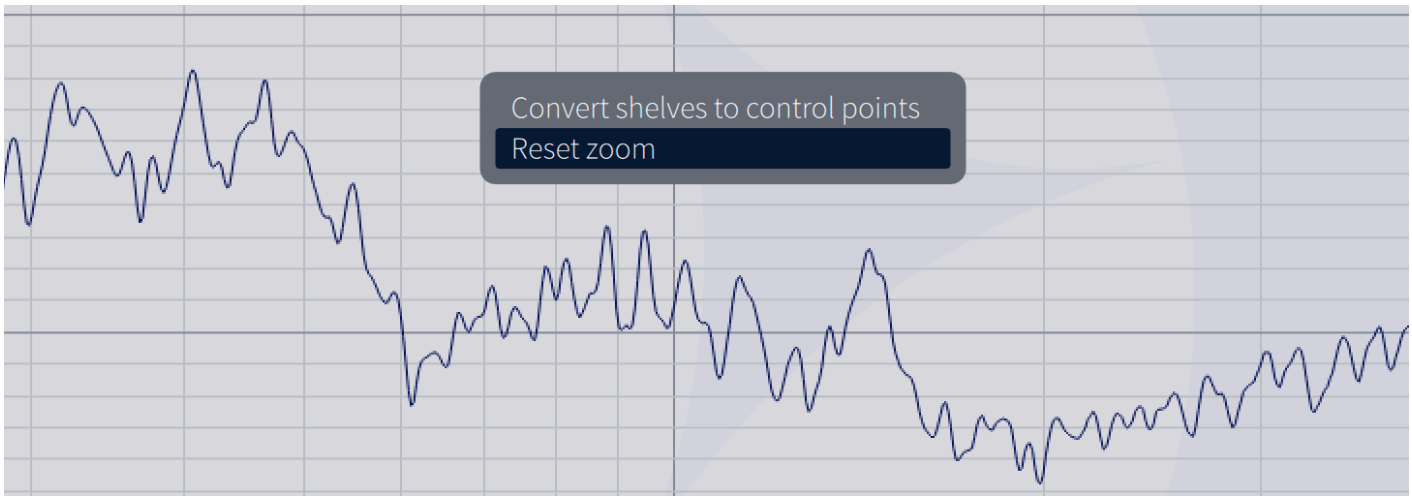
Display the correction frequency range for the current group or groups. This is shown as "curtains" to the left and right of the graph.

Detected Range

Display two vertical cursors indicating the frequency range within which Dirac Live has determined the speakers of the current group to have reasonable output. Note: at low frequencies, environmental noise can cause this estimate to be incorrect.

Zooming in on the graph

The graph can be zoomed in and out by using the mouse wheel, or with zooming gestures on a touchscreen or touchpad. To move a zoomed graph, left-click and drag with the mouse, or use the grab and move gesture with a touchscreen. To zoom out to 100%, double-click on the graph or right-click and select **Reset zoom**.

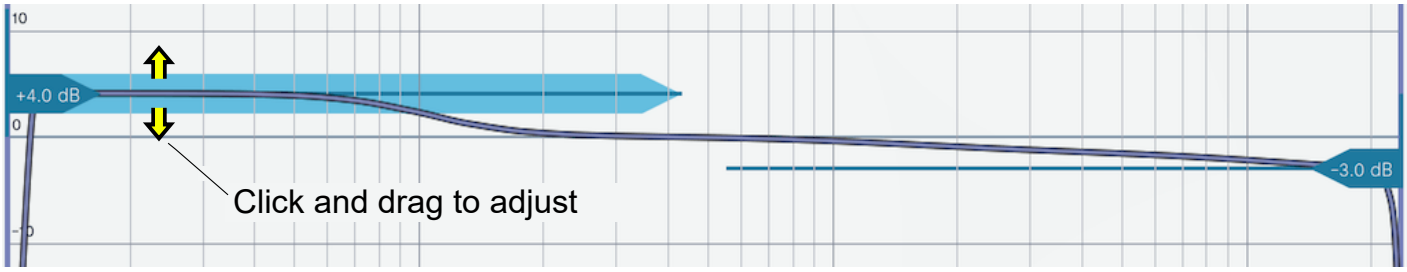


Adjusting the target curve

The target curve is the response you desire from the speakers after correction. This will be an average of different locations around the listening area.

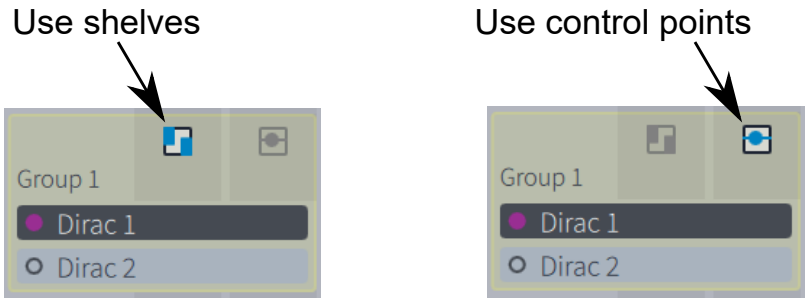
Using the shelving controls

By default, the target curve provides two controls: bass shelf and treble roll-off. Simply grab and drag the horizontal lines to move the level of the bass shelf or degree of treble roll-off or boost. The bass shelf ranges from 0 to +12 dB, while the treble control ranges from -3 to +4 dB.

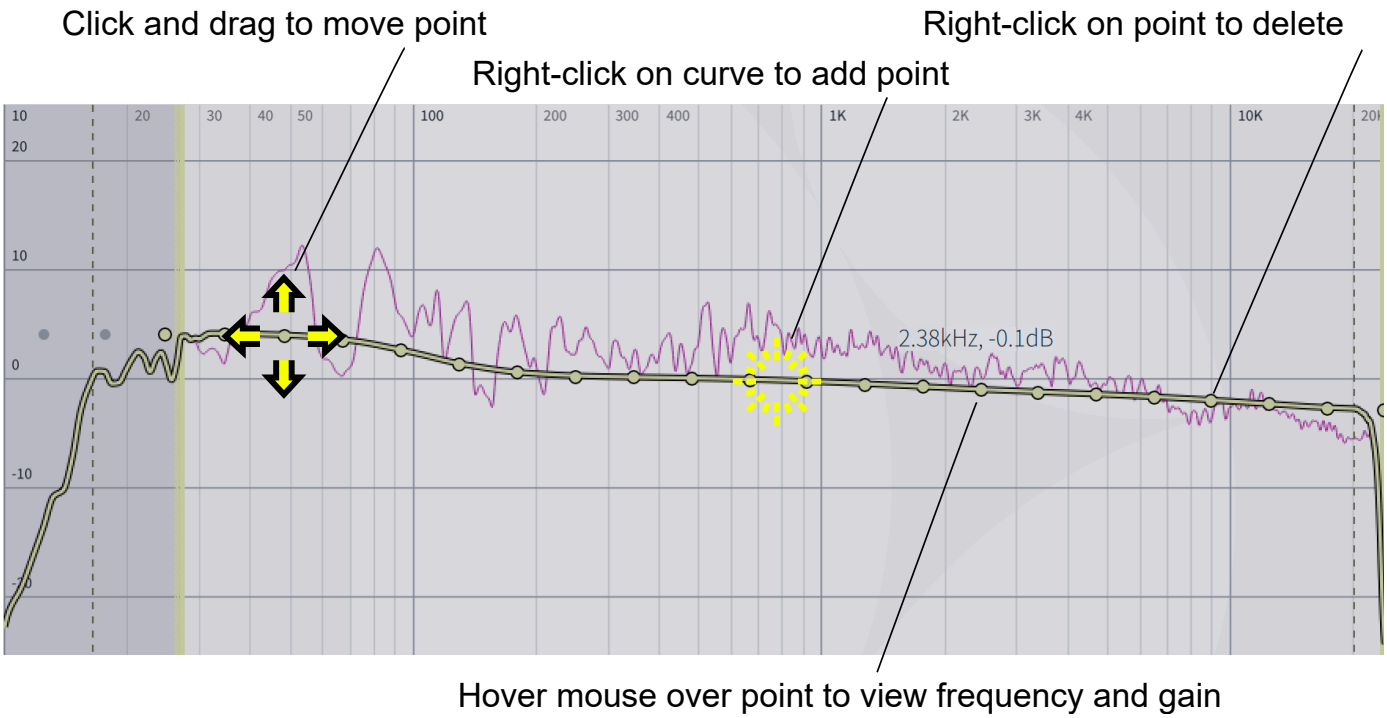


Editing with control points

If the shelving filters don't provide enough control you can switch to using control points with the icons located with each group on the right side of the window:

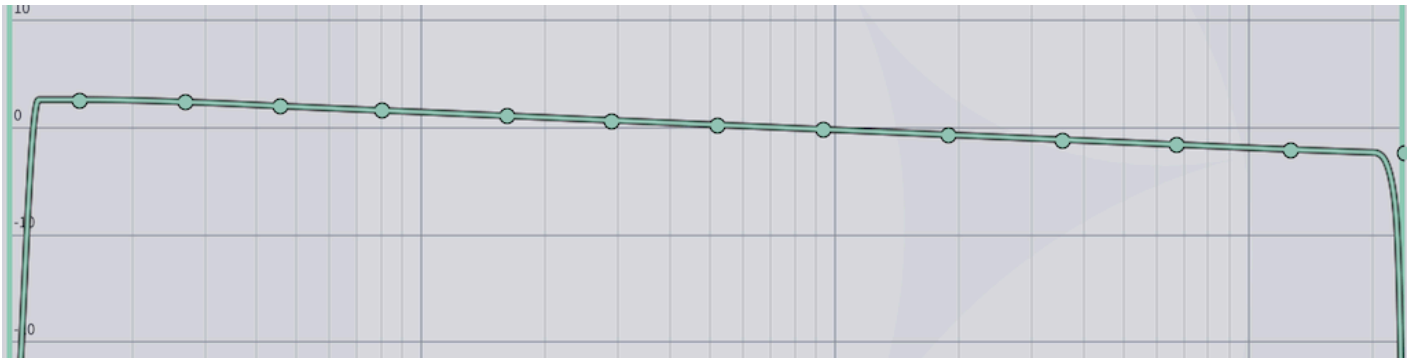


The control points are shown as dots on the target curve, which can be used to edit the target curve as shown here:

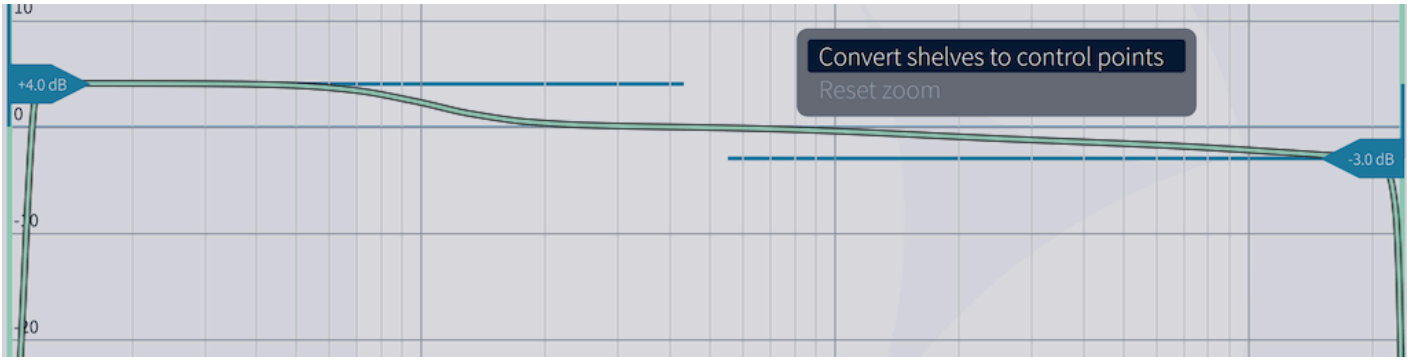


Converting shelving filters to control points

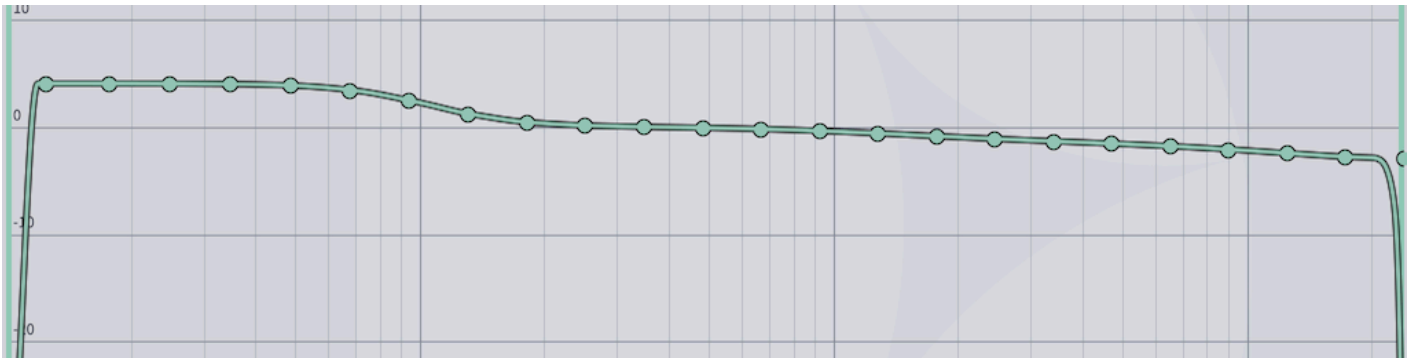
The target curve with shelving filters and the target curve with control points are stored separately, and you can switch back and forth between them. The default target curve with control points is a straight line with a slight downward tilt:



If you would prefer to start with the same shape as the shelving filters, click the icon to view the shelving filter, then right-click on the graph and select **Convert shelves to control points**:



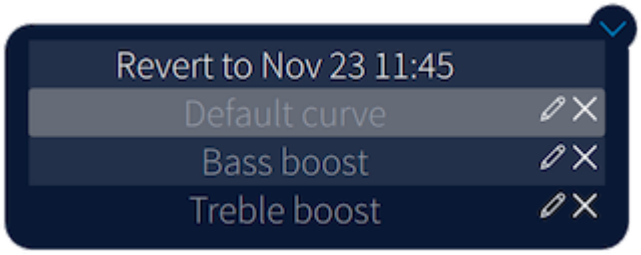
The shape of the target curve with control points will now be the same as the shelving filters, and you can edit further as described above:



Snapshots

You can save the current set of groups, target curves and curtain frequencies by clicking on the **Take snapshot** button:

Snapshots will by default be named as the current time. They can be renamed for easier selection later on. Click on the right side of the button and then on the pencil-shaped icon. Enter the name and press the Enter key:

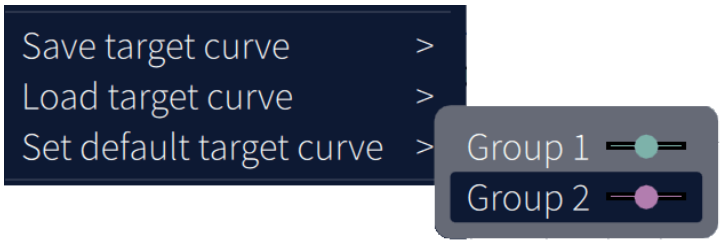


To select a saved snapshot, click on the right side of the button and then click on the desired snapshot.

To delete a saved snapshot, click on the right side of the button and then click on the "x" icon.

Reset to default

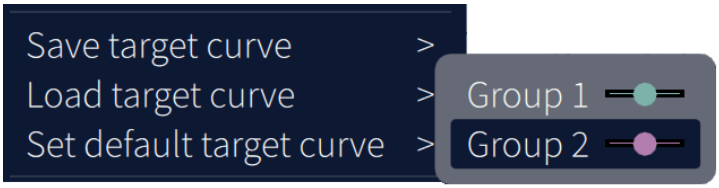
To reset a target curve and the range curtains to the default, drop down the menu from the hamburger icon and select **Set default target curve**, then select the group to reset:



Saving and loading individual target curves

Target curves can be saved and loaded individually for use at a later time or in other projects. To save a target curve, drop down the menu from the hamburger icon and select **Save target curve**, then select the group:

To load a target curve, drop down the menu from the hamburger icon and select **Load target curve**, then select the group:



Guidelines for target curve design

Care should be taken to create a target curve that works well with your speakers and room, as well as suiting your personal preferences. Small changes to the target curve can have significant effects on the tonal quality of the system, so it is important that you experiment with different target curves.

If you initially don't achieve a satisfactory result, ensure that you have spread your measurements over a sufficiently large area and with sufficient variation in height. The following guidelines will help you understand how to adjust your target curve.

Low-frequency extension and boost

All loudspeakers have a natural low frequency roll off. Setting the target curve to boost the region below the speaker's natural roll off frequency *may* result in overdriving the speakers, especially with smaller home loudspeakers and depending on your listening habits. A system with capable subwoofers integrated into it, however, will support much more low-frequency output.

High-frequency "tilt"

The target curve is the desired measured response of loudspeakers *in a room,* in contrast to measurements made of a loudspeaker during its design under anechoic (measured in free space) conditions. While high-quality loudspeakers are usually designed for a flat on-axis anechoic response, these same speakers when placed into a listening room will tend to have a downward-sloping or "tilting" response at high frequencies, due to the effects of limited dispersion at high frequencies and greater acoustic absorption.

A completely flat in-room response is therefore usually not desirable and will tend to sound thin or bright. Start with a target curve that follows the natural behavior of your speakers in your room, and then experiment with greater or lesser degrees of tilt in the treble region to obtain the most natural timbral balance.

Low-frequency adjustment

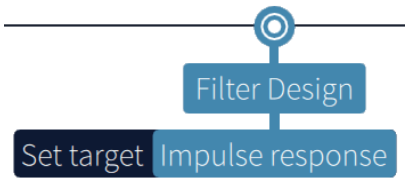
A completely flat response at low frequencies, with complete elimination of peaks due to room modes, may sound light in the bass. Typically, a slight increase in the target curve below 100 Hz will give a more balanced sound.

Magnitude response dips

In some cases, it may be helpful to adjust the target curve to follow dips in the measured response. This can occur where, for example, the listening area is very close to the speakers and the measurements exhibit a dip caused by the vertical response of the speakers themselves. Experiment with a target curve that follows the dips. You may also wish to try a different set of measurement positions.

The Impulse response graph

The Filter Design menu can be used to display the impulse response:

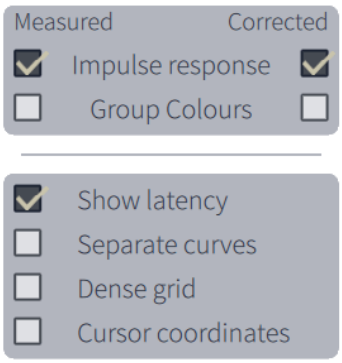


Example impulse response

Below is an example impulse response display. This example shows the original impulse response at the top and the corrected and delayed impulse response below.

Impulse response controls

There are several controls at the right of the graph:



Impulse response

Display the impulse response corresponding to the average of all magnitude responses. If the "Measured" checkbox on the left is on, the impulse response corresponding to the measurements is displayed. If the "Corrected" checkbox on the right is on, the impulse response corresponding to the corrected response is displayed.

Group colors

If checked, the graph colors are the same for all channels in a group. This can be individually selected for the measured and corrected impulse responses.

Show latency

Show the corrected impulse responses on a time scale that includes processing delay.

Separate curves

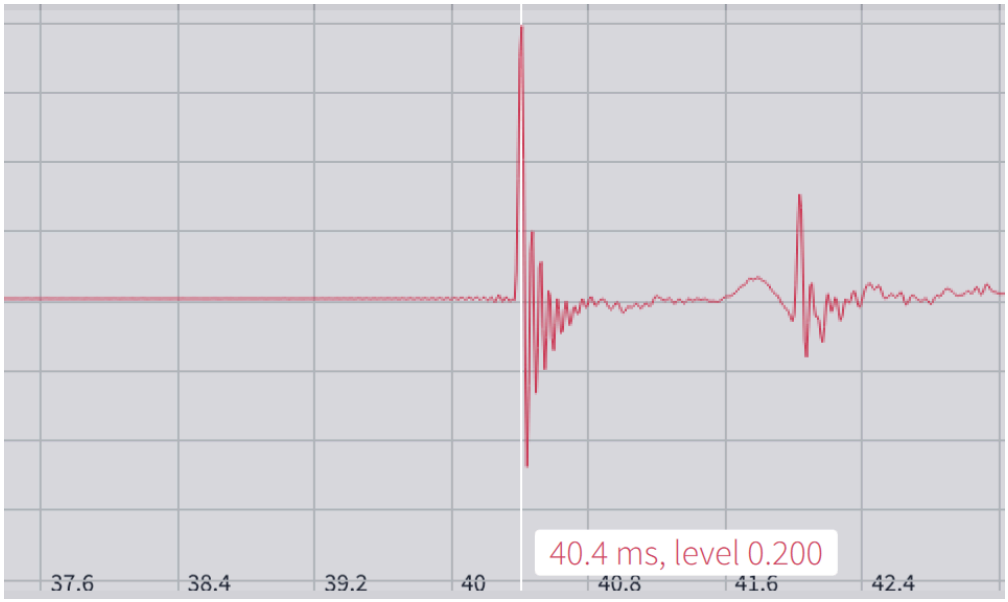
Show the measured and corrected responses on separate graphs. See above for an example.

Dense grid

Display additional grid lines on the graph.

Cursors coordinates

Display a vertical cursor line where the mouse is, together with the time delay and impulse response value at the cursor position.

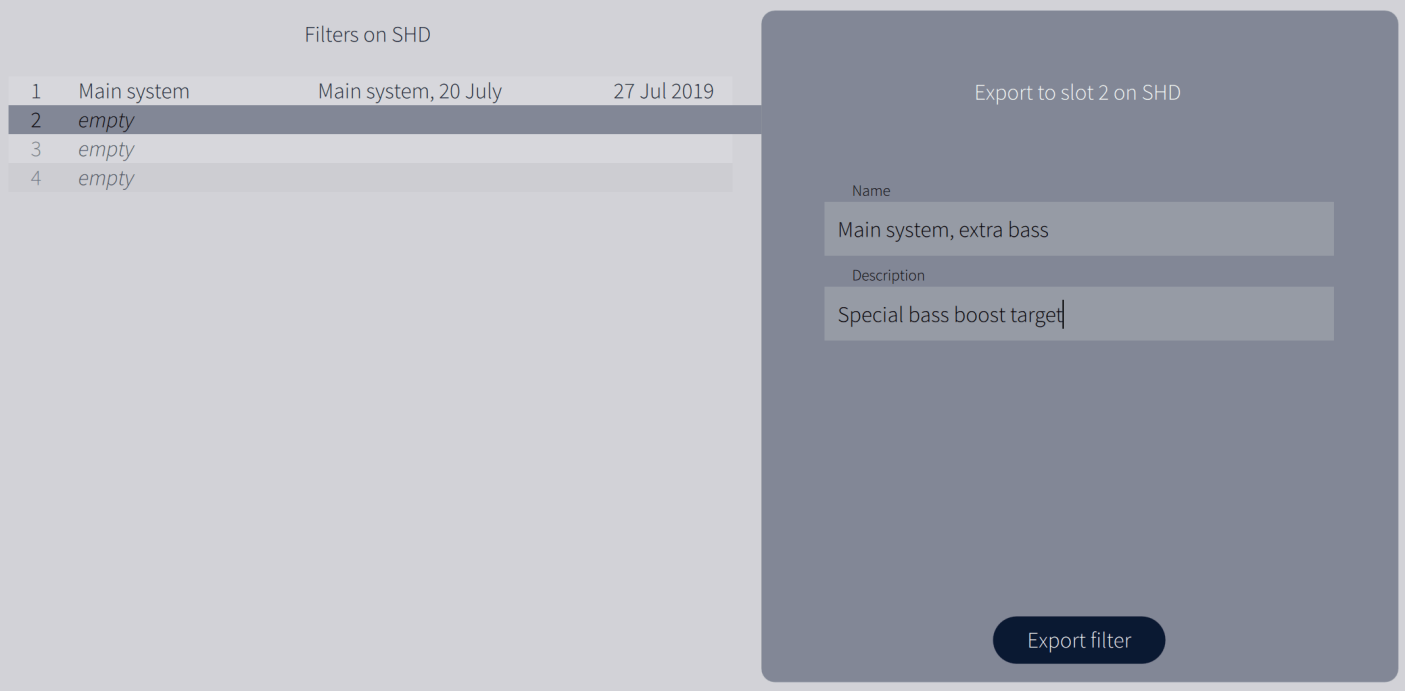

40.4 ms, level 0.200
37.6
38.4
39.2
40
40.8
41.6
42.4

Exporting filters

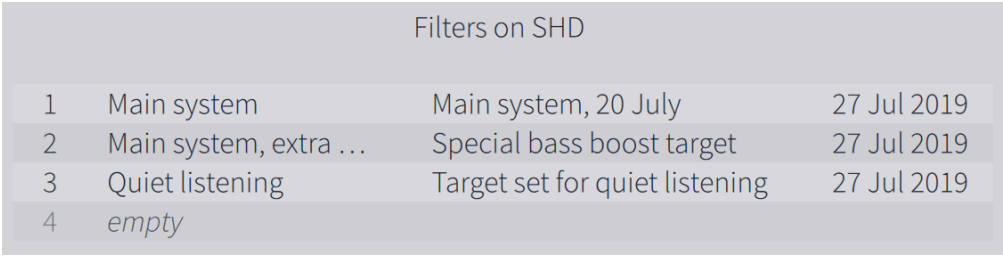
The **Filter Export** tab shows four empty "slots" for filter sets (a filter set is one filter for each channel).

Export a filter

To export a filter into a slot, click on the slot. At the right, enter the name and description and click **Export filter**:



A circular progress indicator will indicate that the filter is being downloaded to the miniDSP SHD. When filter export is complete, the UI will return to the **Measure** tab so you can adjust the target curve to create a different set of filters. Return to the **Filter Export** tab to view the list of loaded filters:



Replace a filter

To overwrite a filter slot, select a slot with a loaded filter and click on **Replace existing filter**.

> **Info**
>
> If you have set up any back-end processing (subwoofer, active speaker, etc.), be sure to load the filter into the same slot as the preset selected when running the Dirac Live calibration measurements.

Delete a filter

Hover the mouse over a filter in the sidebar list. A red circled "x" will appear. Click on it to delete that filter.

Switch between filters

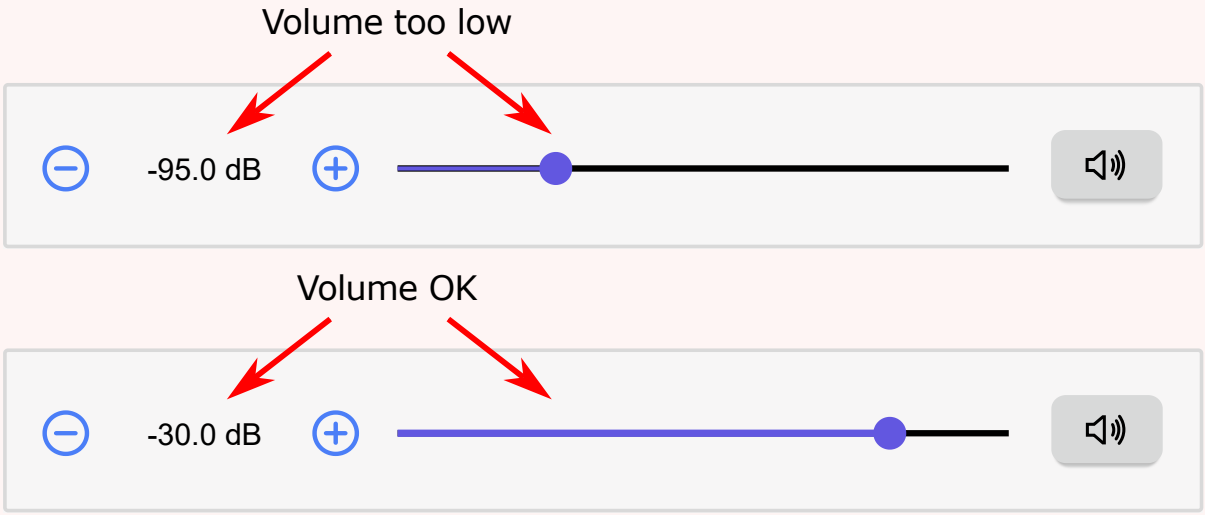
To audition different filters while still running the Dirac Live application, use the filter selection checkboxes in the sidebar to choose the filter set to listen to:

> **Info**
>
> Selecting a filter here will also select the matching preset in the back-end processing set up by miniDSP Device Console.

Check your device volume

NOTICE: Check your device volume

After you export a filter and quit the Dirac Live app, you must **check the volume of your device**. (This is because the Dirac Live app may have reduced the device volume as a safety feature.)



AutoEQ

Overview of the AutoEQ feature

The AutoEQ feature provides a simple measurement and EQ tool for users who may not wish to learn the full feature set of tools such as REW (Room EQ Wizard). Furthermore, it is tightly integrated into Device Console to simplify the measurement and EQ process.

> **Info**
>
> The AutoEQ feature requires a direct USB connection from your computer to the SHD. It cannot be used via the miniDSP Wi-DG (Wifi to USB bridge).

How AutoEQ works

The AutoEQ feature is designed to make it easy to perform an automatic EQ and load the designed filters into the miniDSP SHD via Device Console.

As such, the interface for measurement and EQ is launched from within the relevant PEQ block. In the miniDSP SHD, there are four locations for parametric EQ, as highlighted in red here:

Within each parametric EQ block, a simple button opens the AutoEQ screen *for that block*:

AUTOEQ

The AutoEQ feature uses REW (Room EQ Wizard) running as a background task to perform its measurements and calculations. However, the normal REW user interface does not appear; instead, a new screen in Device Console replaces it.

Installation and activation

> **Info**
>
> AutoEQ is an optional upgrade. It can be used only if the upgrade has been purchased and activated, as described below.

Install or update REW

AutoEQ uses REW in the background to perform its measurements and calculations. REW must therefore be installed on your computer.

Currently, V5.40 **beta** of REW is required. Use this link to take you to the download site, where you can click on the link for your platform to download the latest version:

- REW API beta releases (https://www.avnirvana.com/threads/rew-api-beta-releases.12981/#post-97700)

After downloading, double-click to install. We recommend accepting the default installation settings. You do not need to run REW at the end of the installation procedure.

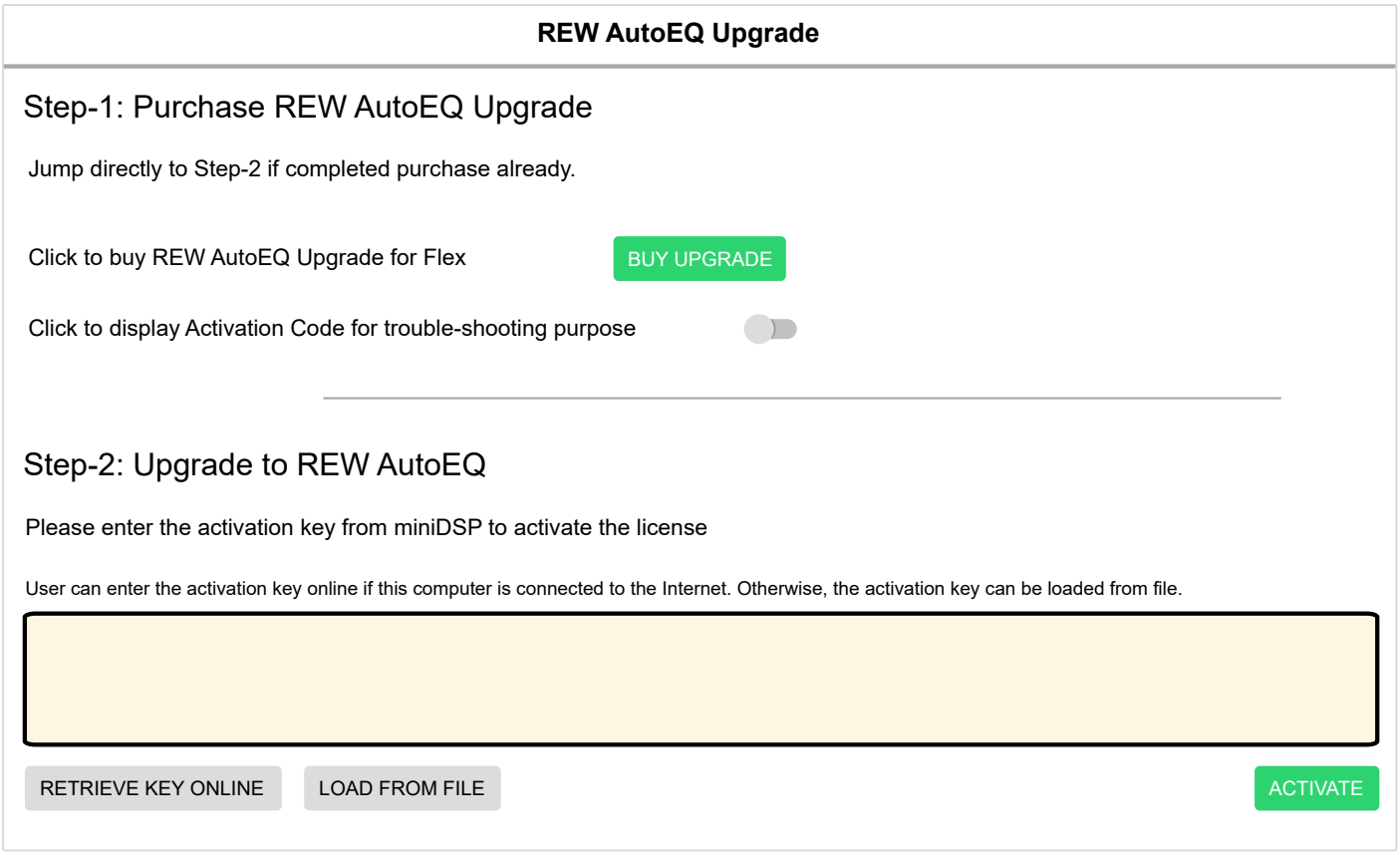
> **Info**
>
> If you install REW in a non-standard location, you will need to use the **API Options** dialog to tell Device Console about the installed location. See If REW fails to start.

1. Purchase the AutoEQ upgrade

> **Warning**
>
> The AutoEQ upgrade applies **per device**. It will work only on the device that you are connected to at the time you purchase the upgrade.

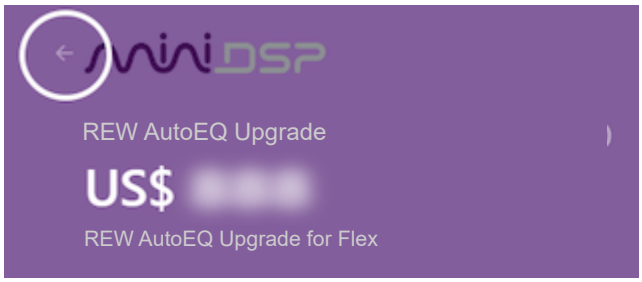
Connect to your SHD using Device Console. Open any of the PEQ blocks and click the **AUTOEQ UPGRADE** button:

The upgrade window will open:



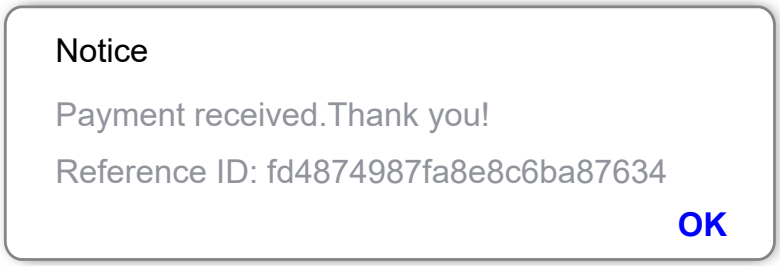
The upgrade is a two-step process: 1. purchase; 2. activate.

Click on **BUY UPGRADE**. A browser window will open on stripe.com. Enter your payment details and click **Pay**. You will be redirected to an acknowledgement screen, and also receive a receipt by email.

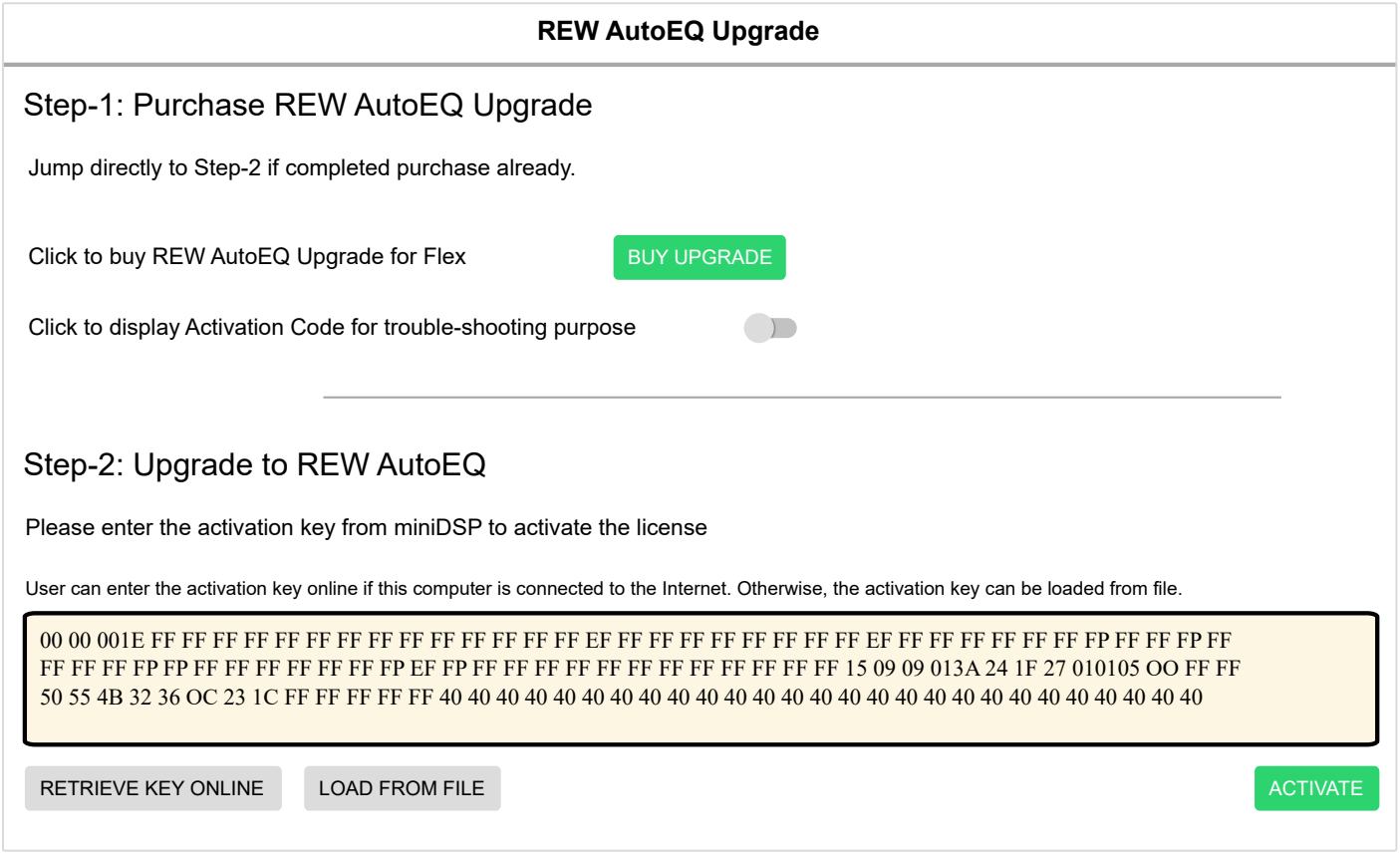
> **Info**
>
> After you press the **Buy Upgrade** button, Device Console will wait for an acknowledgement from the payment system. If you decide not to proceed with the upgrade, click the back-arrow button near the top left of the purchase screen. Here is an example:
>
> 
>
>
> If you just close the payment window, Device Console will wait 30 minutes for the acknowledgement; in that case, quit and restart the Device Console application.

2. Activate the AutoEQ upgrade

After payment completes, return to the miniDSP Device Console window. You will see acknowledgement of successful payment:



Click OK to return to the upgrade screen:



Click on **RETRIEVE KEY ONLINE** to retrieve the activation key. Then click **ACTIVATE** to activate the upgrade on your SHD.

> **Tip**
>
> Retrieving the activation key online requires an active Internet connection. If you have a device that needs to be activated while offline, save the activation key file that was attached to the purchase acknowledgement email onto a USB stick. On the device to be activated, click **LOAD FROM FILE** and select the file from the USB stick.

After activating, the SHD will restart.

First steps

Download your microphone calibration files

Each UMIK-1 and UMIK-2 measurement microphone is individually calibrated to ensure accuracy. To download the unique calibration files for your microphone, go to the UMIK-1 page (https://www.minidsp.com/products/acoustic-measurement/umik-1) or the UMIK-2 page (https://www.minidsp.com/products/acoustic-measurement/umik-2) . Enter your microphone's serial number. It is in the form xxx-yyyy and labelled on the microphone.

Two calibration files are downloaded:

- The regular or "on axis" calibration file will be saved to the computer with a name that is the same as the serial number e.g. "7001870.txt". This is the one that you should use when pointing the microphone towards the speakers.
- The second calibration file has "_90deg" in the name e.g. "7001870_90deg.txt." This corrects the frequency response when the microphone is oriented at 90 degrees to the sound source, such as when pointing the microphone towards the ceiling.

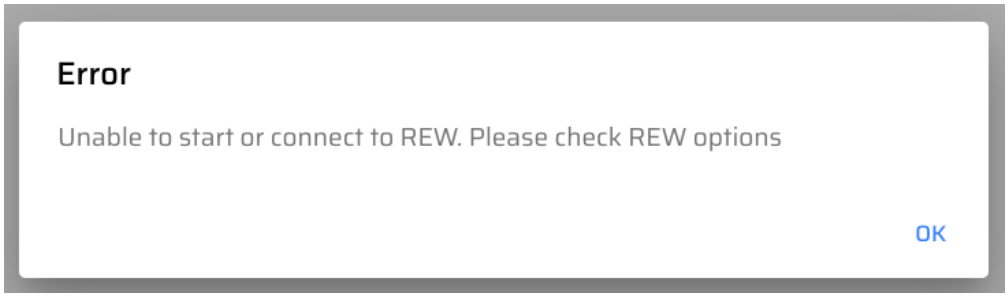
Start AutoEQ

To start the measurement/EQ process, open a PEQ block. This is the block where filters from the autoEQ process will be loaded. Once in the PEQ window, click on the AUTOEQ button near the top right of the window:

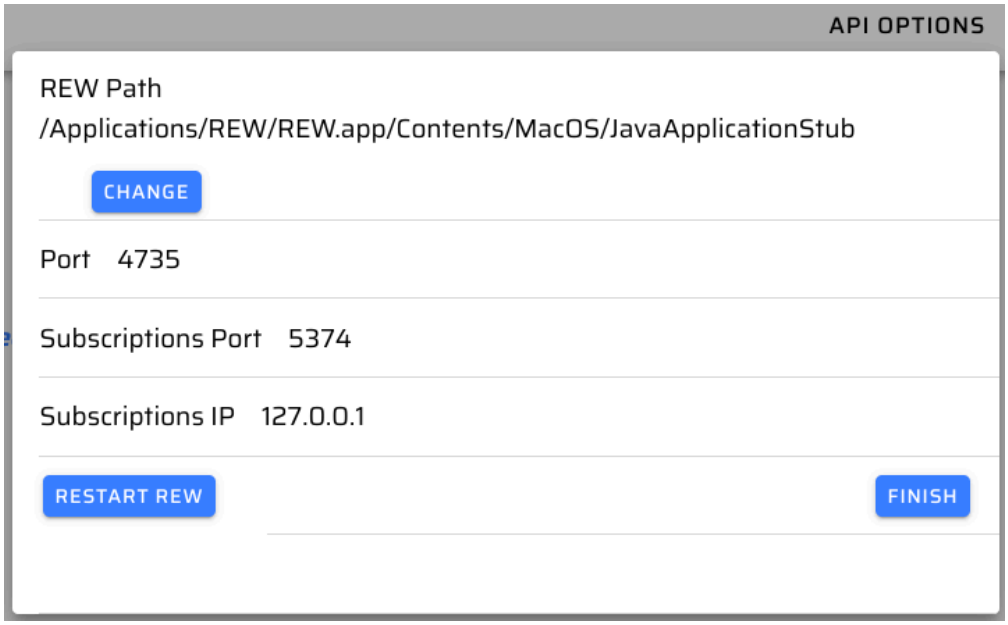
Device Console will start REW in the background. This takes a short time, but status messages will show the background activity.

If REW fails to start

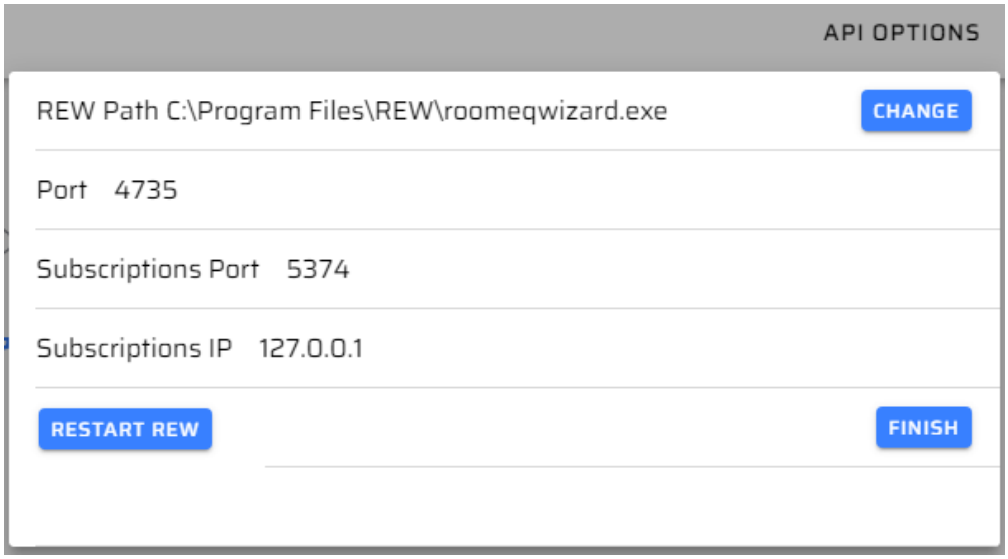
If REW fails to start, you will see an error message like this:



This is most likely because REW has not been installed in the default location. To correct it, click on **API Options**. Here are the default settings:



AutoEQ API options on macOS

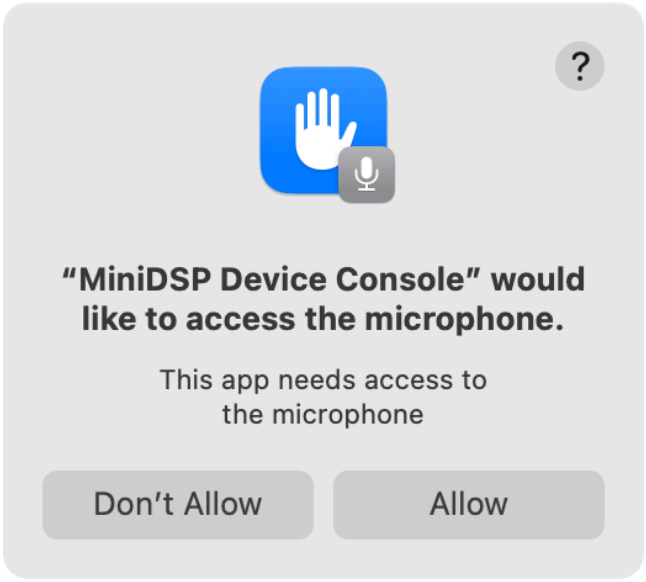


AutoEQ API options on Windows

Next to REW Path, click on **CHANGE** and use the file selector dialog to select the correct location. Then click **RESTART REW**.

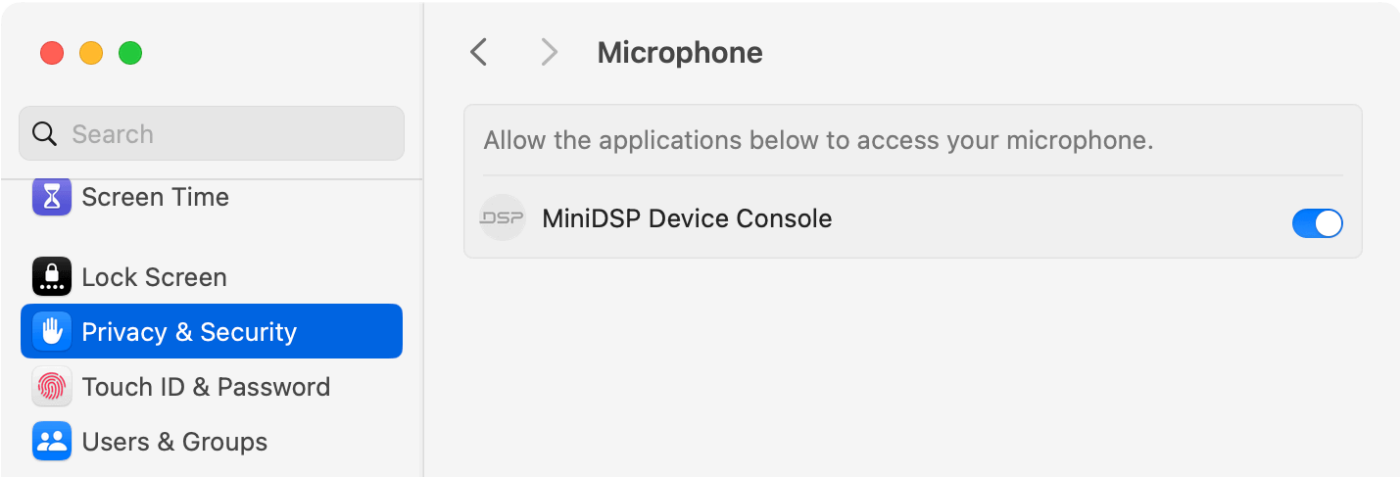
macOS notes

On macOS, you may be asked to approve access to the microphone by miniDSP Device Console:



Click on **Allow**.

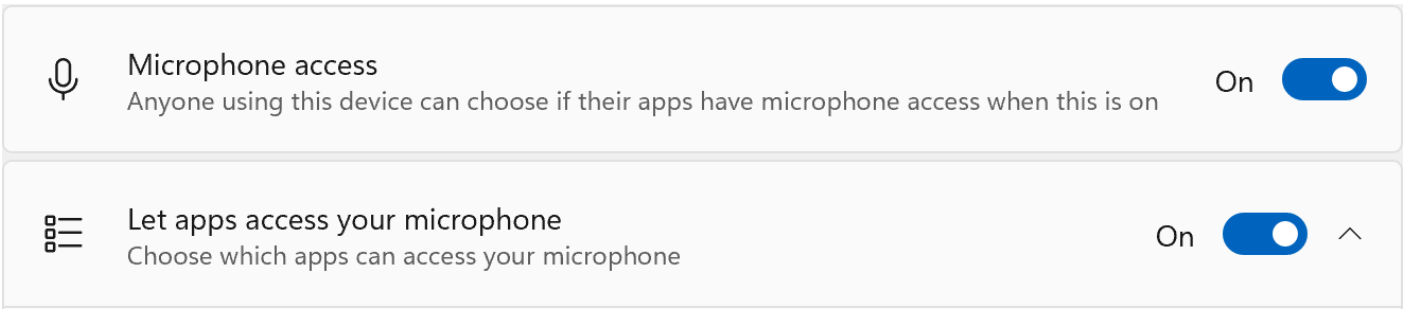
You can check microphone access in System Settings. Click on **Privacy & Security** and scroll down to **Microphone**. Click on it and check that miniDSP Device Console is in the list and has microphone access:



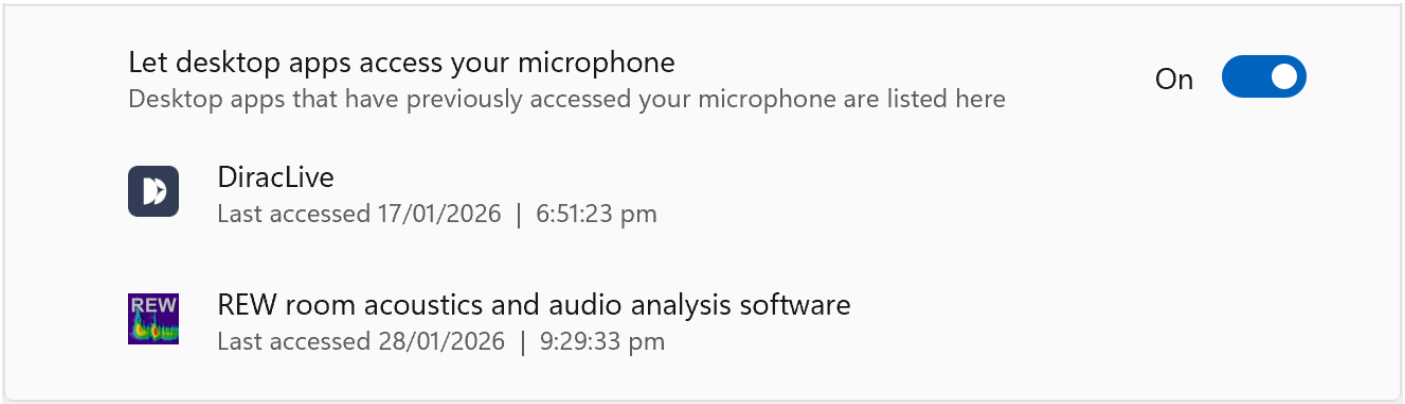
Windows notes

If you get error messages that REW is unable to access the microphone or that there is no audio input, check that you have not disabled REW's access to the microphone.

Open the Windows Settings and select Privacy & security, then scroll down and select Microphone. Check that "Microphone access" and "Let apps access your microphone" is turned on.

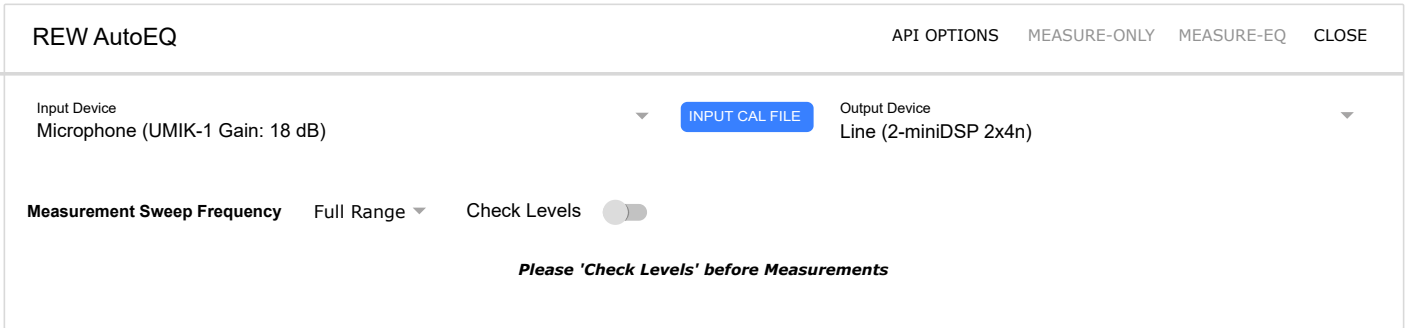


Scroll down and check that "Let desktop apps access your microphone" is also turned on, and that REW is listed in the applications that are allowed to access the microphone:



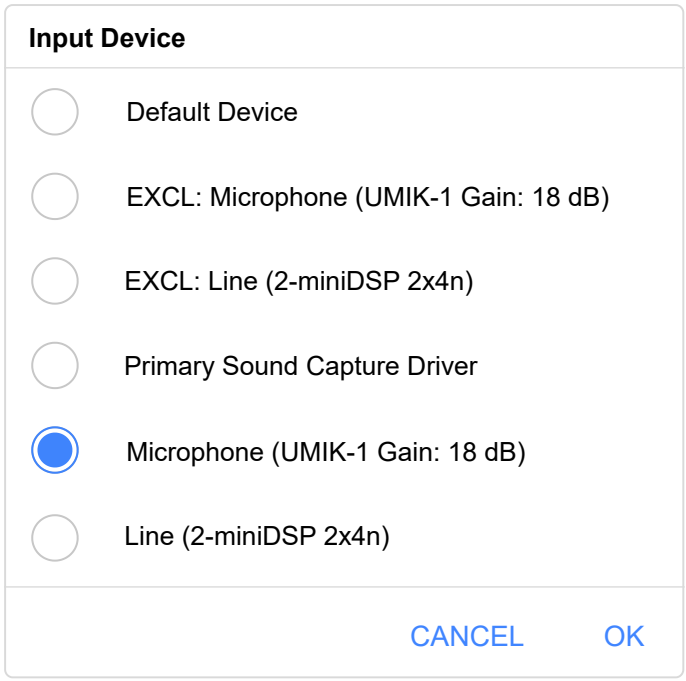
Check input/output devices

Once AutoEQ loads, you will be presented with this screen:



Confirm that the correct input and output devices are selected. This should be the UMIK-1 or UMIK-2 for the input device, and the SHD for the output device.

If they are not, click on the downward-facing arrow to the right of each label and select the desired device. For example, this is a typical input selection dialog on Windows:



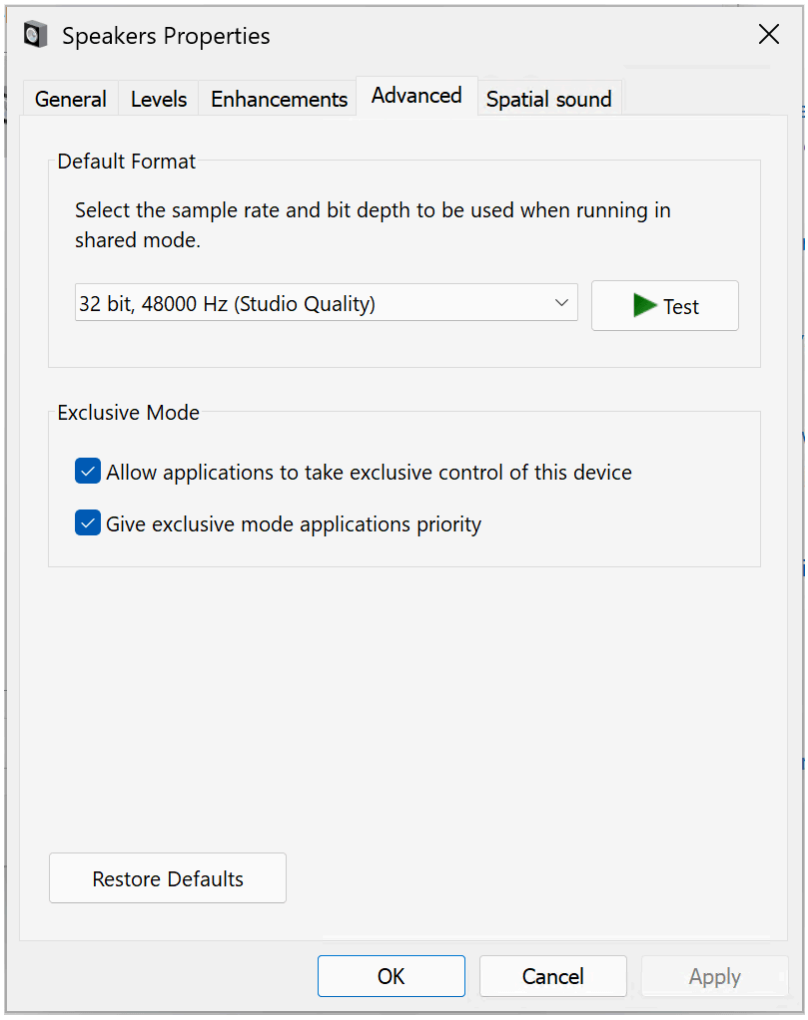
Select the desired device and click **OK**.

EXCL devices (Windows only)

On Windows, "EXCL" devices are used to give the application exclusive access to that device. They use the WASAPI exclusive access mode, whereas devices not prefixed by EXCL use JavaSound's built-in access.

Either version can be chosen. The EXCL devices will have higher resolution (Javasound is limited to 16 bits), but this is not important for acoustic frequency response measurements. In infrequent cases, selecting an EXCL device can cause issues; if this occurs, switch to the non-EXCL version.

Note that, for an EXCL version of a device to appear, the option "Allow applications to take exclusive control of this device" must be selected. This can be found in the Windows Control Panel: choose Manage Audio Devices, select the device from either Playback or Recording, click Properties, then choose the Advanced tab:



Tip

If you experience issues, check that the input and output devices (i.e. SHD and UMIK-1/2) are **not** set as the default input and output devices in Windows. If the devices allow exclusive access, this may prevent REW from being able to use the device.

Load calibration file

If you have not previously used the AutoEQ interface, load your UMIK-1/2 calibration file:

1. Click on the **INPUT CAL FILE** button.
2. Locate your UMIK-1 calibration file in the file system and select it. The calibration file name will then be displayed:

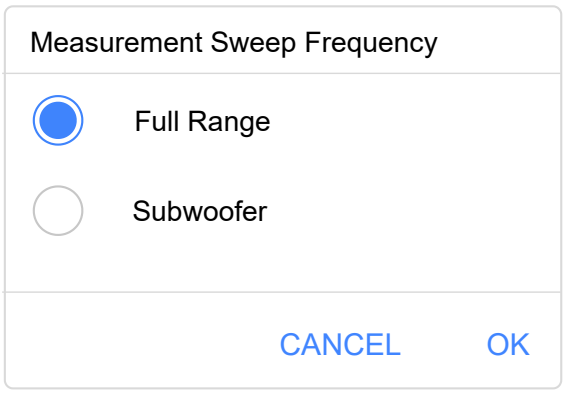
Cal File: 7056760.txt CHANGE REMOVE

Note: If you have used the AutoEQ interface before, the calibration file will already be loaded and you do not need to repeat this step.

> **Tip**
>
> Although the screenshot above shows the calibration file in the Downloads folder, we recommend that you move your calibration files to a "safe" location in your file system. Be sure also to include them in your computer backups and to transfer them when you change computers.

Set Measurement Sweep Frequency

Use the dropdown menu to select the measurement sweep frequency range:

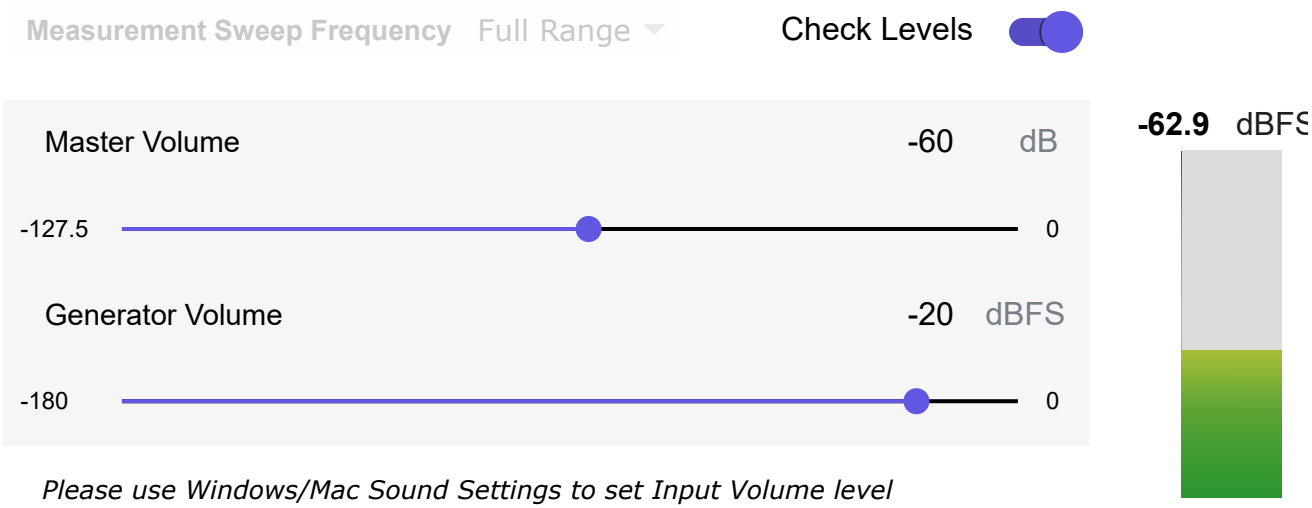


This setting should be chosen to match the type of speaker that you are measuring. Note that it affects both the range of pink noise that will be used for the levels check, and the range of frequencies swept when performing subsequent measurements.

Check levels

The next step is to check the audio levels for measurement.

1. Click the switch labeled "Check Levels". The master volume will be set to -60 dB and the test signal will start at -20 dB FS.



Please use Windows/Mac Sound Settings to set Input Volume level

2. Adjust the master volume and the generator level if necessary to increase the volume to a moderate level, such that your voice would have to be raised to converse with someone sitting next to you. The icons below will flash above the meter to indicate whether the microphone is receiving sufficient level:

3. Click the switch labeled "Check Levels" again to turn the test tone off.

The buttons MEASURE-ONLY and MEASURE-EQ will now be enabled. They are described on the next two pages.

API OPTIONS MEASURE-ONLY MEASURE-EQ CLOSE

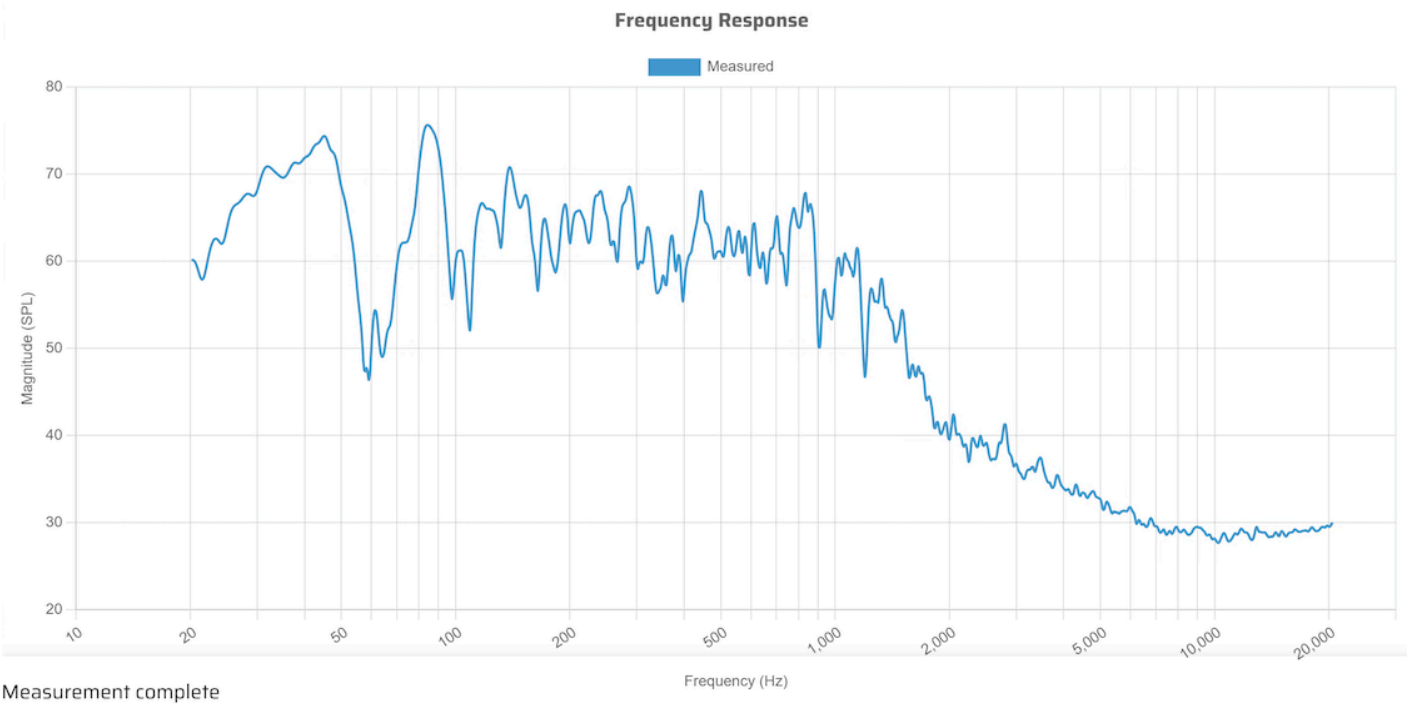
Measure

To run a basic measurement *without* AutoEQ, click the MEASURE-ONLY button.

Measurement overview

When the MEASURE-ONLY button is pressed, Device Console will start a measurement sweep. The grey bar underneath the "REW AutoEQ" label functions as a progress bar, and will progress from left to right twice: once when setting up the measurement and once when running the measurement. (Audio will be produced only on the second.)

When the measurement is done, Device Console will display the result as two graphs: the magnitude response and the impulse response. Here is an example measurement of a subwoofer:



Adjusting graph scale

The frequency range (horizontal scale) can be adjusted to give the most useful view of the displayed data.

1. To pan the graph left and right, click on the graph and drag to the left or right while holding the mouse button down.

2. To adjust the scale of the graph, enable the Zoom button at the top right. Then use the mouse wheel (or trackpad) to zoom in and out of the graph.

Note that the Zoom button is disabled by default. When disabled, the mouse wheel (or trackpad) can be used to scroll the page up and down.

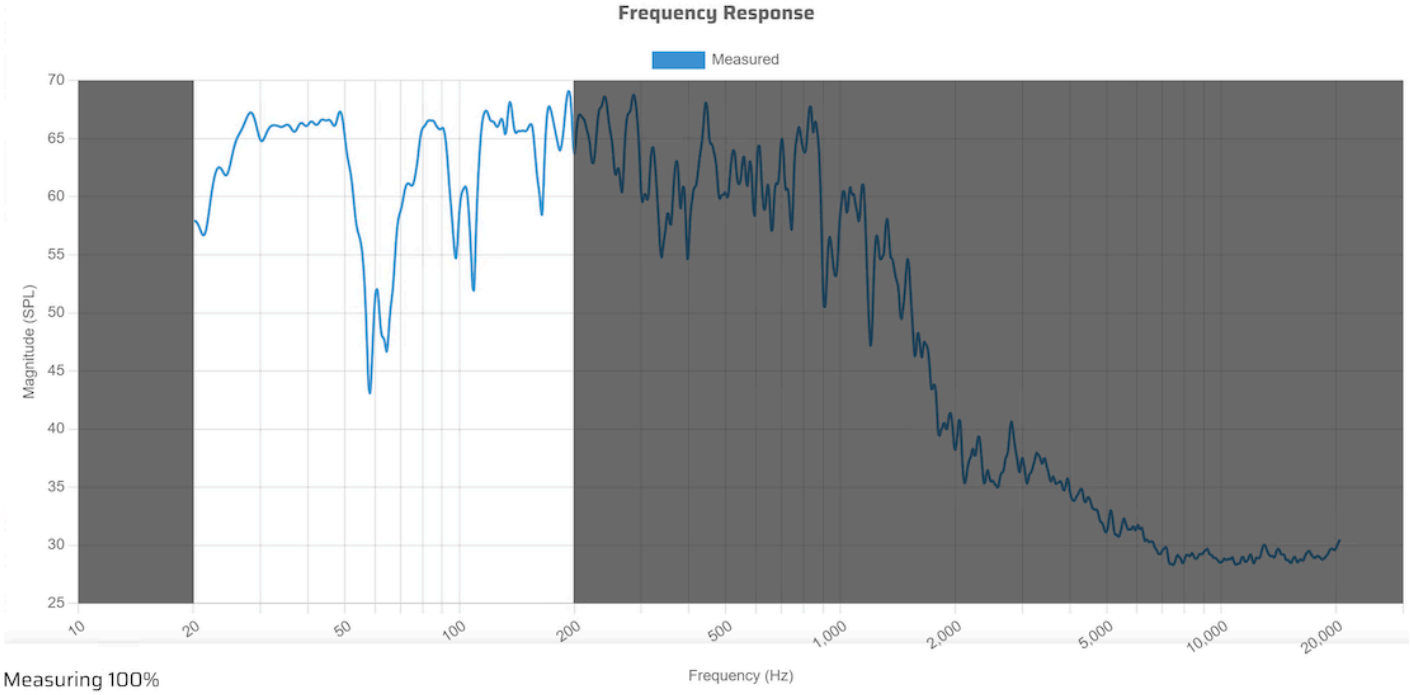
Usage of the MEASURE-ONLY tab

When using the MEASURE-ONLY screen, **all PEQ filters are active**. Therefore, the measurement shows the response as it will be when using the SHD normally.

Typical ways to use this tab are therefore:

1. Before running AutoEQ, run a measurement on this screen in order to see your starting point.
2. *After* running and applying AutoEQ, run a measurement on this screen to see the effect of the EQ.

The graph shown above is case (1). This next graph is case (2), a measurement after applying AutoEQ as described on the next page:



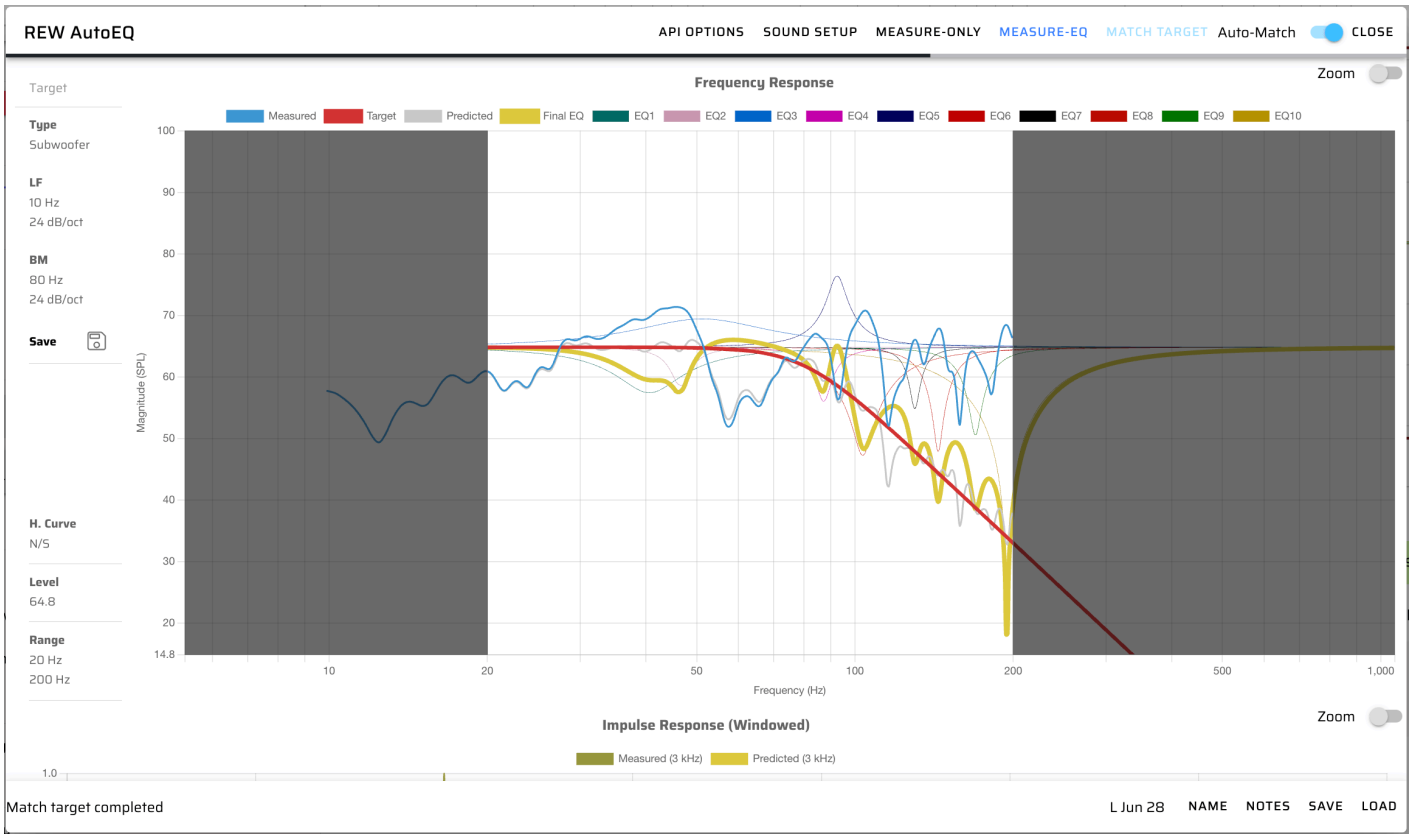
Measure and EQ

To run a measurement and then apply EQ to correct the measured response, click the MEASURE-EQ button.

AutoEQ overview

When the MEASURE-EQ button is pressed, Device Console will start a measurement sweep. The grey bar underneath the "REW AutoEQ" label functions as a progress bar, and will progress from left to right twice: once when setting up the measurement and once when running the measurement. (Audio will be produced only on the second.)

When the measurement is done, REW will then calculate a correction EQ based on the measurement and display the result. An example result is shown below.



While running this measurement, Device Console will **disable all filters in that PEQ block**. The measurement therefore does not include those filters, so that the AutoEQ can generate a new set of filters to replace them.

Note also that the display that you see will depend on various parameters that you may have set on previous runs, which are described further below.

> **Info**
>
> Because Device Console will disable any existing filters in the PEQ block while it is running the measurement, you do not have to clear them first. The idea is that your new EQ will *replace* the existing EQ. Note, however, that all filters in *other* PEQ blocks, as well as crossover filters, will still be active.

Adjusting graph scale

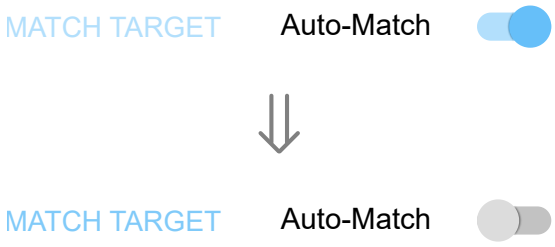
The frequency range (horizontal scale) can be adjusted to give the most useful view of the displayed data.

1. To pan the graph left and right, click on the graph and drag to the left or right while holding the mouse button down.
2. To adjust the scale of the graph, enable the Zoom button at the top right. Then use the mouse wheel (or trackpad) to zoom in and out of the graph.

Note that the Zoom button is disabled by default. When disabled, the mouse wheel (or trackpad) can be used to scroll the page up and down.

Auto-Match or manual EQ

By default, Device Console recalculates the target level and the EQ whenever a new measurement is taken or any of the parameters below are changed. To disable this, turn off the Auto-Match switch in the top menu:



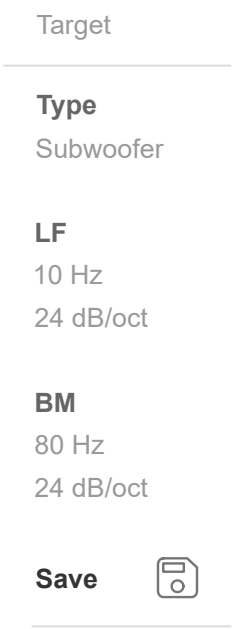
Then, when you are ready, click the **MATCH TARGET** button to re-calculate the EQ.

Adjusting AutoEQ settings

There are a number of settings that you can change to adjust the AutoEQ to suit your system and needs. These are arranged on the left of the main graph.

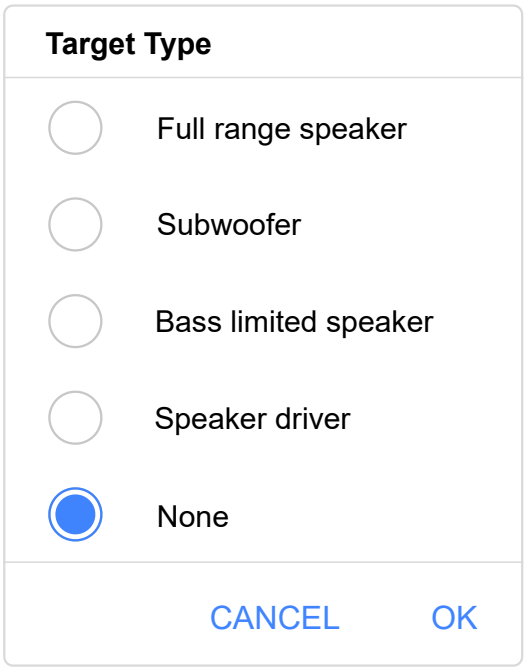
Target Type and filters

The Target Type selects high and low pass filters that modify the target curve away from flat. This is an example of these settings in the left sidebar:



Target Type

Click on **Type** to open a dialog with five target types:



Each type has zero, one, or two high pass and low pass filters, as summarized in the table below.

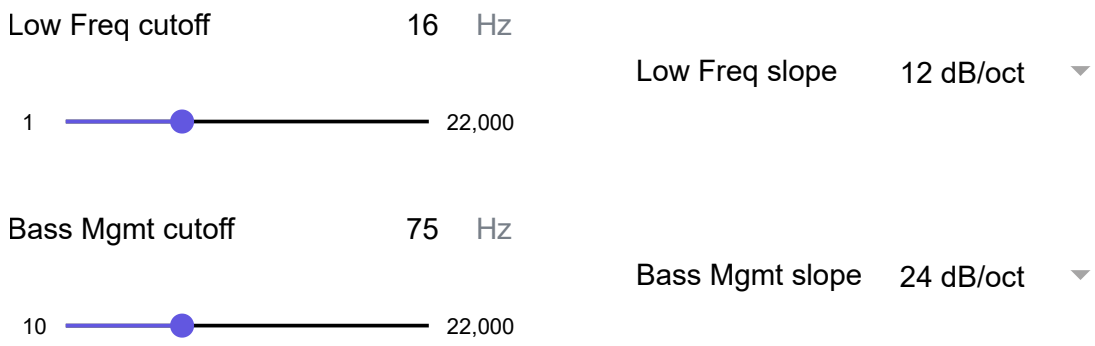
Target type	High pass filter (default)	Low pass filter (default)
Full range speaker	10 Hz	—
Subwoofer	10 Hz	80 Hz
Bass limited speaker	80 Hz	—
Speaker driver	100 Hz	1000 Hz
None	—	—

> **Tip**
>
> These filters apply to the *target curve* only. They do **not** affect the audio processing.

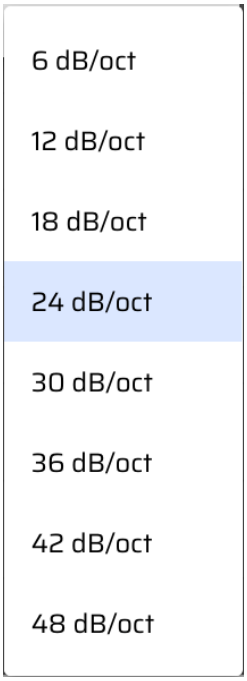
For more details on target types and their filters, see Tips and Guidelines.

Target filters

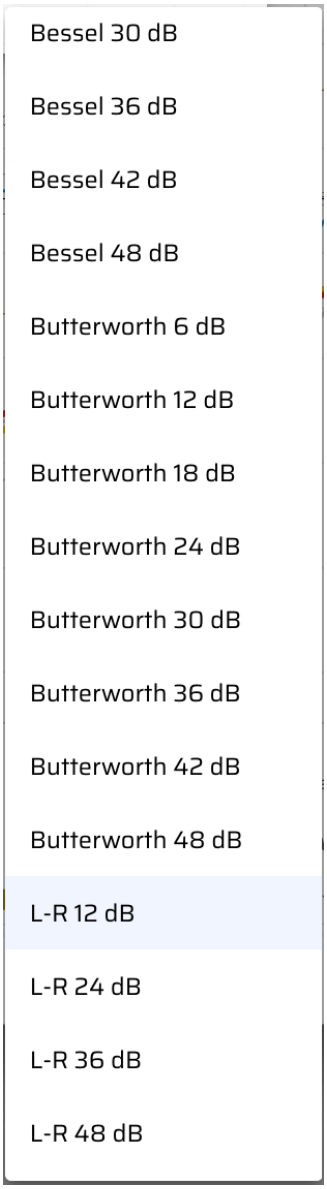
To adjust the target filters, click on the filter parameters to the left of the main graph. An overlay will pop up where the filter frequency, type, and slope can be selected. These examples illustrate the two most common types:



Clicking on the dropdown selector will display the selection of slopes. For the low-frequency and bass management filter, these are all **Butterworth** filter slopes:



For the high pass and low pass crossovers of the **Speaker Driver** type, a full selection of filter types is available:

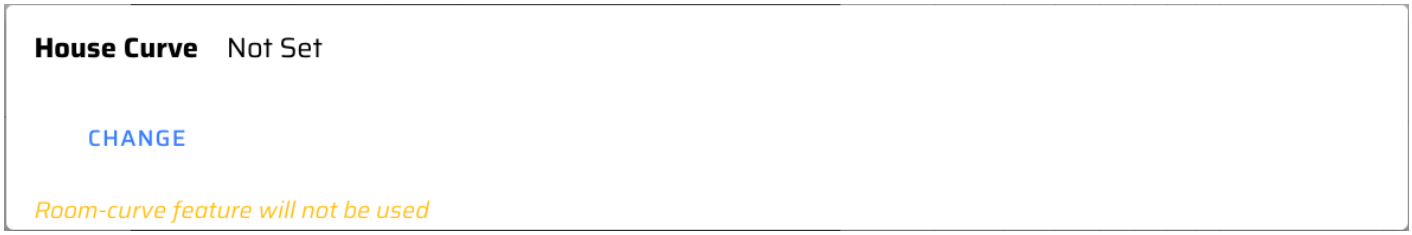


Saving the target type and filter settings

Click on **Save** to store the target type and filter settings. These will then be used by default the next time AutoEQ is run.

House curve

A file containing a sequence of response points can be loaded to define a *house curve*. Click on the **H. Curve** label in the left sidebar to open the house curve overlay, then click on **CHANGE** to select a house curve file:



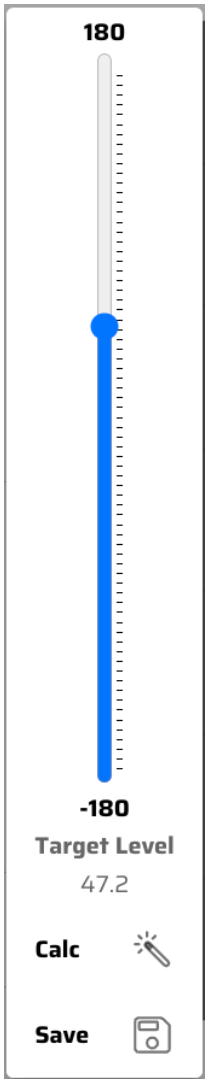
For more information, see the REW House Curve (https://www.roomeqwizard.com/help/help_en-GB/html/housecurve.html) documentation.

Note that the house curve does not affect the high pass and low pass filters that are defined according to Target Type.

Target Level

The target level is the flat region of the target line, shown in red on the response graph. If the Auto-Match switch is on, the target level will be calculated based on the measured response.

If you wish to manually change the target level, click on **Level** in the left sidebar. The level adjustment window will appear:



- To manually adjust the target level, click on or drag the vertical slider.
- To have REW recalculate the target level based on the measurement, click **Calc**. (This option is available only if Auto-Match is *off*.)
- To save the current target level as the default level, click **Save**.

Match Range

The match range is the range over which REW will calculate the EQ filters. This range is indicated by the white area on the frequency response graph, with the grey area excluded (more or less) from correction.

To adjust the match range, click on **Range** in the left sidebar to bring up the range slider:

The upper and lower frequencies can be changed by dragging the endpoints, or by clicking on a numeric value and typing a new value. Once the focus is on a value, the up and down arrows can be used to increment and decrement the frequency.

View filters

The details of the filters that REW calculated can be viewed at the bottom of the screen

EQ Filters APPLY

Filter	Type	Freq (Hz)	Gain (dB)	Q
1.	PK	32	-4.1	7.5
2.	PK	37	-2.1	15.0
3.	PK	45	-8.0	4.4
4.	PK	83	-5.7	16.3
5.	PK	88	-7.4	9.1
6.	PK	126	-4.6	15.7
7.	PK	132	9.0	7.5
8.	PK	139	-11.3	16.5
9.	PK	153	-2.9	25.6
10.	PK	182	5.1	7.5

Managing measurements

Several buttons at the bottom of the window help in managing your measurements:

In the above example, the measurement was automatically assigned the name "L Jun 9".

NAME

Click to change the name of the measurement.

NOTES

Click to add a note to the measurement.

SAVE

Click to save the measurement to the file system.

LOAD

Click to load a measurement from a file.

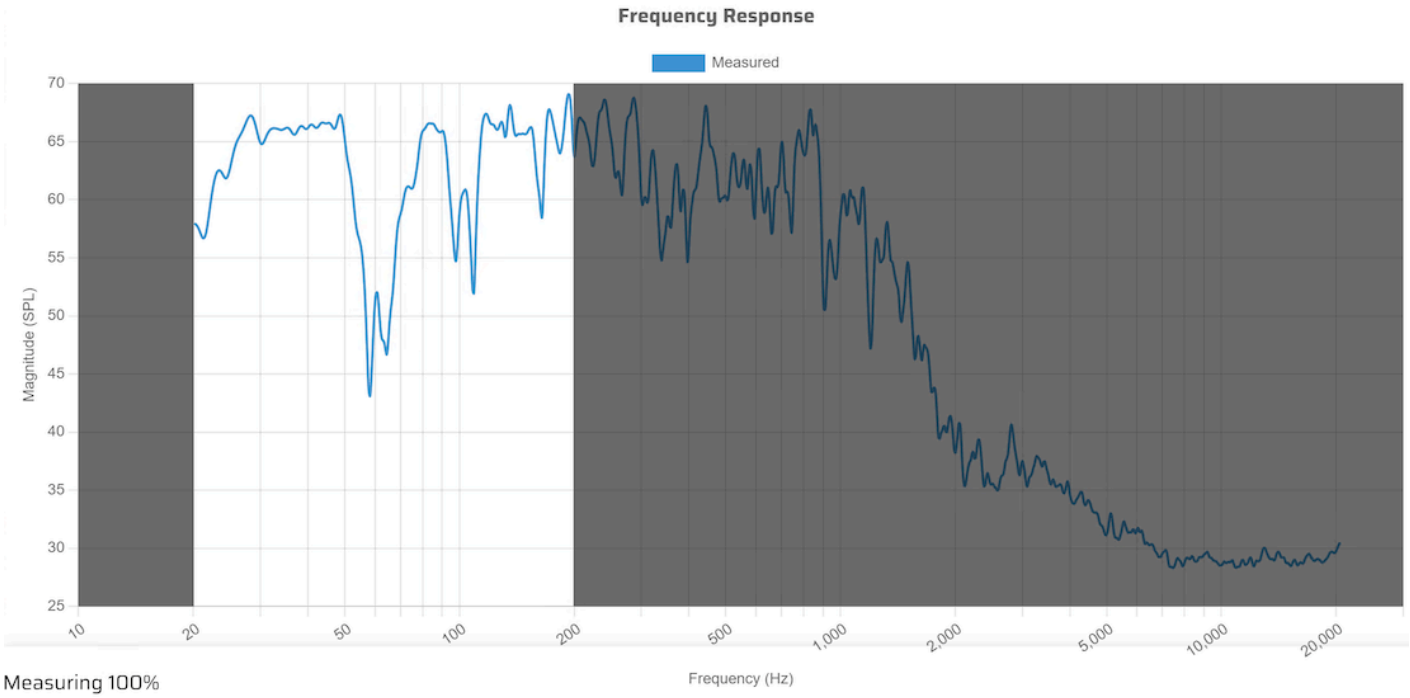
Apply the EQ

Once you are satisfied with the EQ, click on the **APPLY** button:

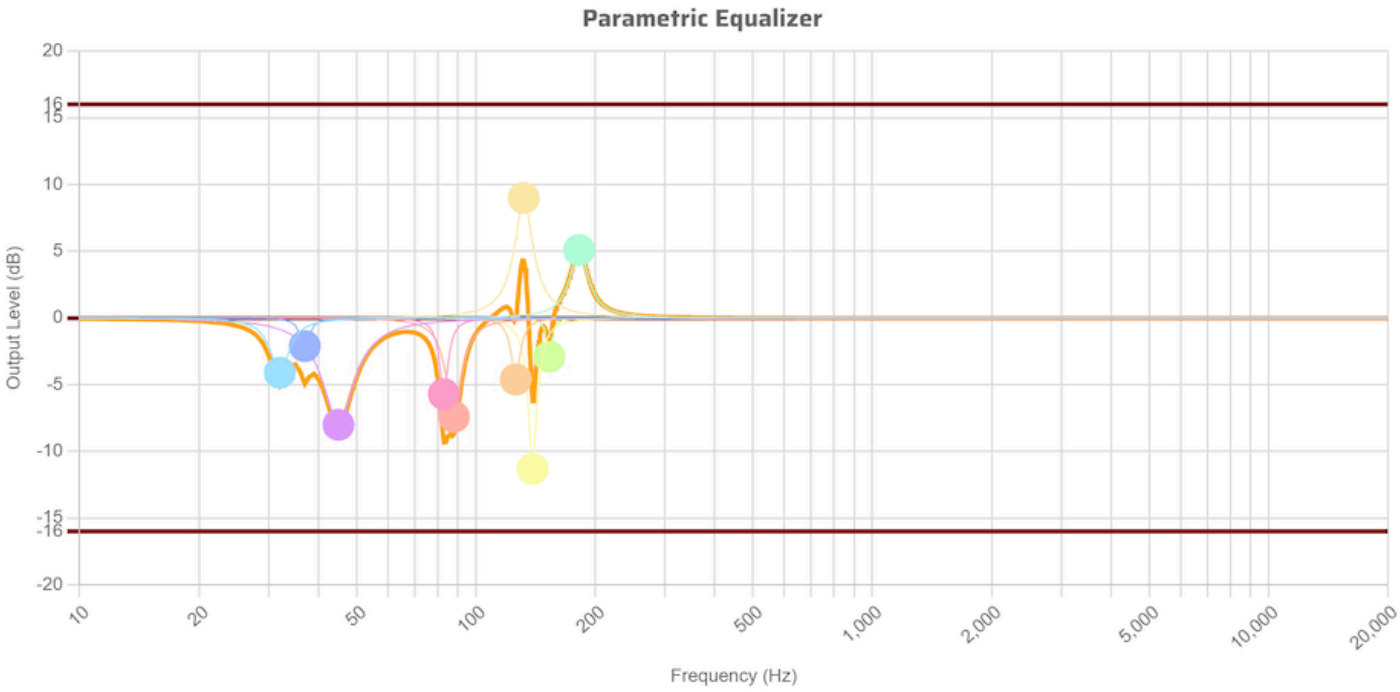
APPLY

The EQ filters will be loaded into the PEQ block.

The effect of the EQ filters can be verified with the MEASURE-ONLY button. For example, this is a measurement of the subwoofer after applying the EQ (also shown on Measure page):



You can now close the AutoEQ window. The EQ filters will be displayed on the main PEQ page:


Parametric Equalizer
Output Level (dB)
20
16
15
10
5
0
-5
-10
-15
-16
-20
10
20
50
100
200
500
1,000
2,000
5,000
10,000
20,000
Frequency (Hz)

Tips and guidelines

This page contains tips and guidelines for use of the AutoEQ feature.

Target type

The Target Type selection controls the high pass and low pass filters present in the target curve. **It does not directly affect the audio processing in the miniDSP SHD.**

This setting is used so that REW can match the EQ to existing crossover filters in the signal chain. For example:

- Crossover filters that are set in the SHD, on the same channel that you are performing AutoEQ on.
- A lowpass filter implemented in the bass management of an A/V receiver or processor, when using the SHD to control one or more subwoofer.
- The lowpass filter implemented in a powered subwoofer.

Two usage scenarios

Depending on your needs, you can use the AutoEQ feature in one of two ways:

1. Crossover then EQ

   The crossover is added into the signal chain first. Then, use the appropriate Target Type and set the filters used by AutoEQ to match the crossover filters that you have set in the signal chain.

2. EQ then crossover

   The EQ is done first, usually to a flat target. Then the crossovers in the signal chain are enabled. In this case, use the "None" target type.

If the crossovers are being implemented in the SHD, the second usage scenario (EQ then crossover) can be more flexible, as it is easier to change or adjust crossover frequencies later (that is, there is no need to run another autoEQ if you change the crossover).

Target type details

Full range speaker

This type adds a high pass filter to the target curve. This is typically used for one of two purposes:

- To protect the speaker from excessive low-frequency energy, or

- To match the measured in-room response to the default natural frequency and slope of the speaker.

Subwoofer

This type adds low pass and high pass filters to the target curve.

- The low pass filter (named "LF" in the UI) is used to protect the subwoofer from excessive low-frequency energy.

- The high pass filter (named "BM" in the UI) is used to match the subwoofer's in-room response to a bass management crossover that has been set in the SHD or further upstream in, for example, and AVR (depending on the application).

Bass limited speaker

This type adds a high pass filter to the target curve (named "BM" in the UI). This is typically used when the speaker is being crossed over to a subwoofer.

Speaker driver

This type adds low pass and high pass filters to the target curve, and is typically used when equalizing a single speaker driver. This is intended for *advanced* users only.

Typically, the filters will be set to the same frequency and slope as set in the in the crossover blocks.

None

The target curve does not have a high pass or low pass filter added.

Additional Information

IMPORTANT INFORMATION

DISCLAIMER/WARNING

miniDSP cannot be held responsible for any damage that may result from the improper use or incorrect configuration of this product. Please read this manual carefully to ensure that you fully understand how to operate and use this product, as incorrect use or use beyond the parameters and ways recommended in this manual have the potential to cause damage to your audio system.

Please also note that many of the questions we receive at the technical support department are already answered in this User Manual and in the online application notes on the miniDSP.com website. So please take the time to carefully read this user manual and the online technical documentation. And if an issue arises with your unit, please read through the Troubleshooting section first. Thank you for your understanding!

WARRANTY TERMS

miniDSP Ltd warrants this product to be free from defects in materials and workmanship for a period of one year from the invoice date. Our warranty does not cover failure of the product due to incorrect connection or installation, improper or undocumented use, unauthorized servicing, modification or alteration of the unit in any way, or any usage outside of that recommended in this manual. If in doubt, contact miniDSP prior to use.

FCC CLASS B STATEMENT

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Warning: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Notice: Shielded interface cable must be used in order to comply with emission limits.

Notice: Changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

CE MARK STATEMENT

The miniDSP SHD has passed the test performed according to European Standard EN 55022 Class B.

Migrating to DC

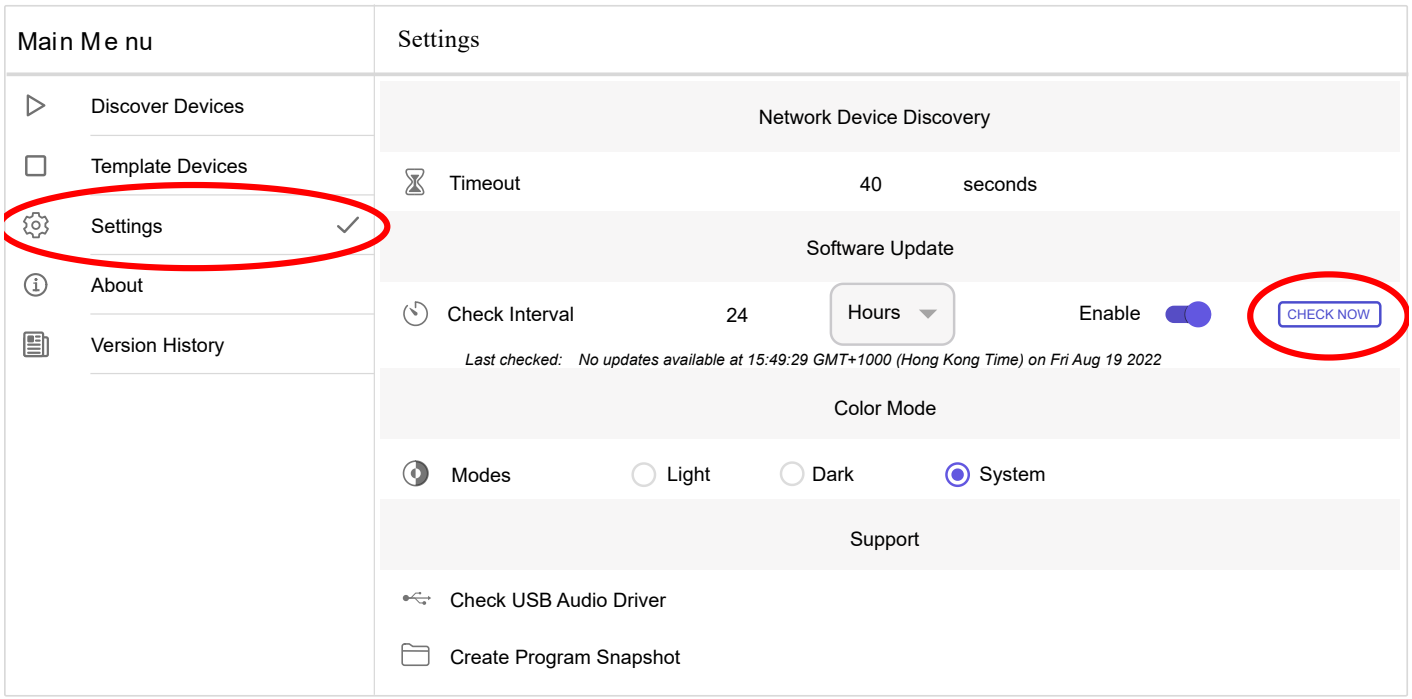
If you have been using the old "plugin" version of the miniDSP control software with your miniDSP SHD and have not yet started using Device Console, you will need to perform a one-time migration procedure.

Follow the procedure described below. Please be sure to perform all steps in order.

> **Tip**
>
> If you are having trouble using your device with Device Console, we recommend that you start again from step 1 and make sure that every step is done in order.

1. Check that you have the latest version of Device Console

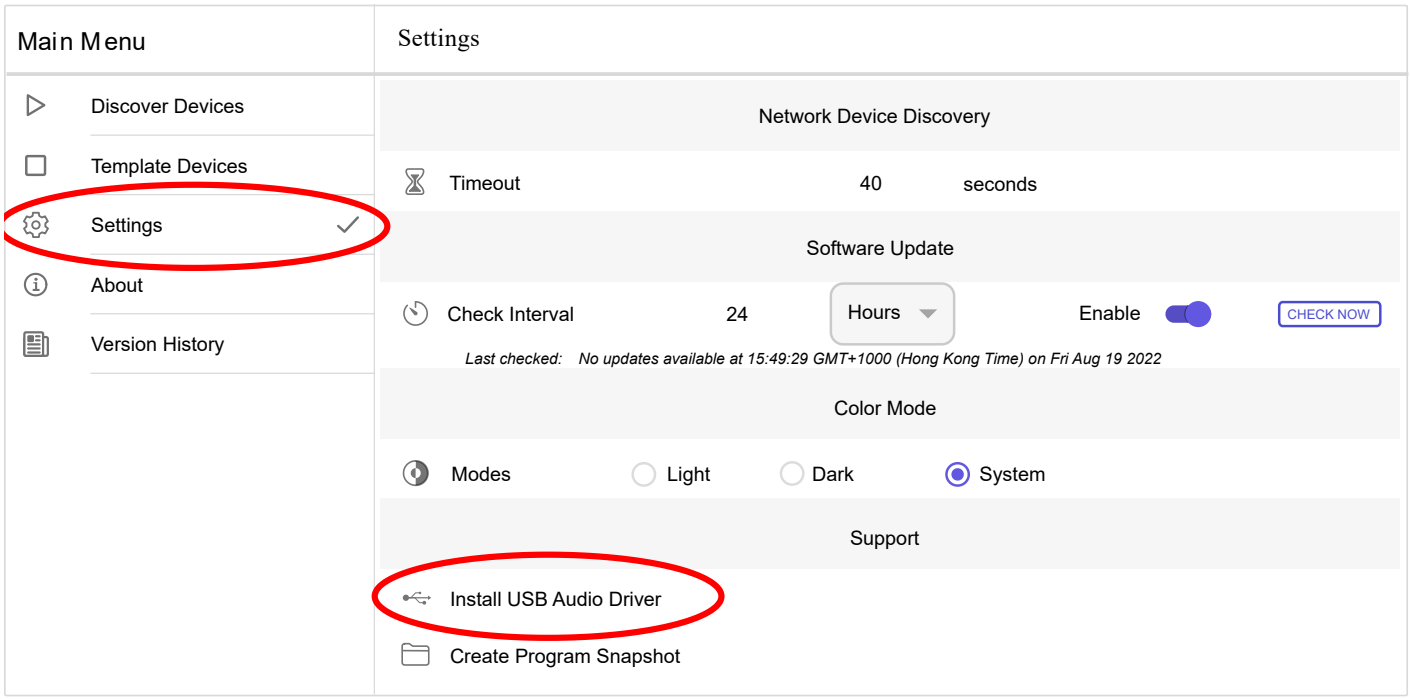
Start miniDSP Device Console. Go to the Settings page and click on **CHECK NOW**:



If a newer version of Device Console is available, you will see a popup offering to download and update to the latest version. Click **YES**.

2. (Windows only) Install the latest USB driver

In the Settings page of Device Console, click on **Install USB Audio Driver**:



Device Console will confirm that you want to install the driver. Click on the **PROCEED** button.

> **Info**
>
> You may already have the latest version of the driver installed. However, we recommend that you always reinstall when migrating to DC, to ensure that this is the case.

3. Update DSP Firmware

Connect your SHD to your computer and power it on. It will appear on the **Discover Devices** page of Device Console. Click on it.

If the SHD needs a DSP Firmware update, this window will appear:

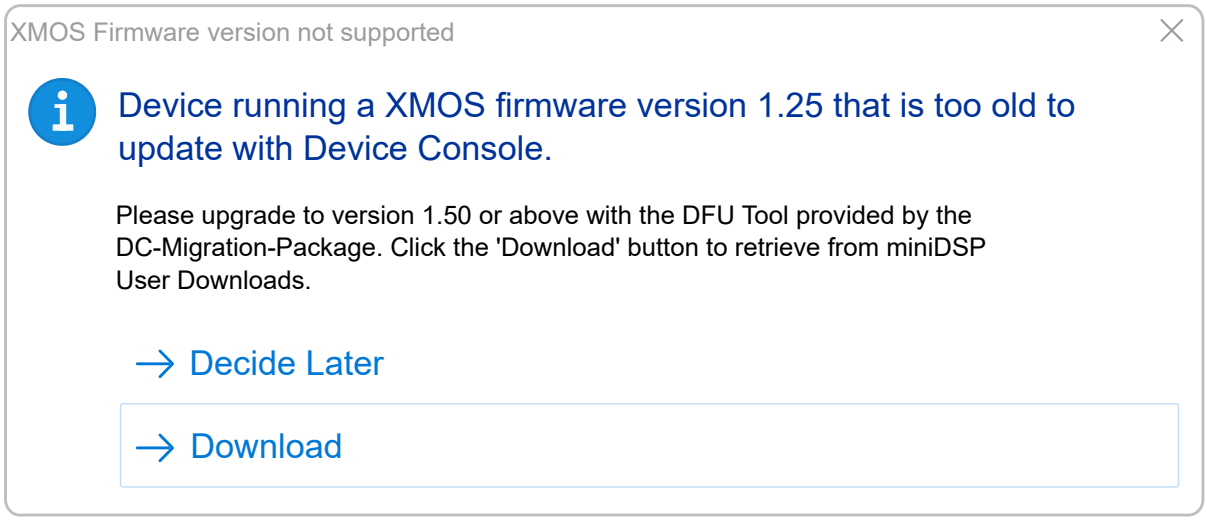
If this message appears, click on **Update Now**. (If it does not appear, you do not need a firmware upgrade and can jump straight to the next step.)

After the firmware update completes, the SHD will restart.

> **Tip**
>
> In some cases, the SHD will not restart properly. If you experience odd symptoms, such as Device Console not returning to the **Discover Devices** page, the SHD not appearing on the **Discover Devices** page, or the DSP Firmware update screen appearing again, power cycle the SHD and restart Device Console.

4. Download the Migration Pack

Locate your SHD on the **Discover Devices** page. Click on it. You will see a message like this:



(If you do not see this message, you do not need to upgrade the firmware and you can skip ahead to the next step.)

Click on the **Download** button to download the Migration pack containing all necessary files. Alternatively, you can download it at any time by clicking on this link:

- Download the Migration Pack for miniDSP SHD (https://phpstack-793508-3229840.cloudwaysapps.com/deviceconsole/migration-packages/SHD%20-%20DC%20Migration.zip)

After downloading, if your browser did not automatically unzip the downloaded file, unzip it manually by double-clicking on it (macOS) or right-click on it and select "Extract All" (Windows).

5. Upgrade the firmware in your SHD

The firmware in your SHD must be upgraded for it to work properly with Device Console. This is a one-time operation that must be performed with the firmware upgrade utility contained in the Migration Pack.

1. Check that the SHD is connected to your computer via USB and that it is powered on.
2. Start the firmware upgrade program.

For Windows, navigate to:

XMOS Firmware ⟩ Firmware_Upgrade_Tools ⟩ Windows ⟩ miniDSPUAC2Dfu

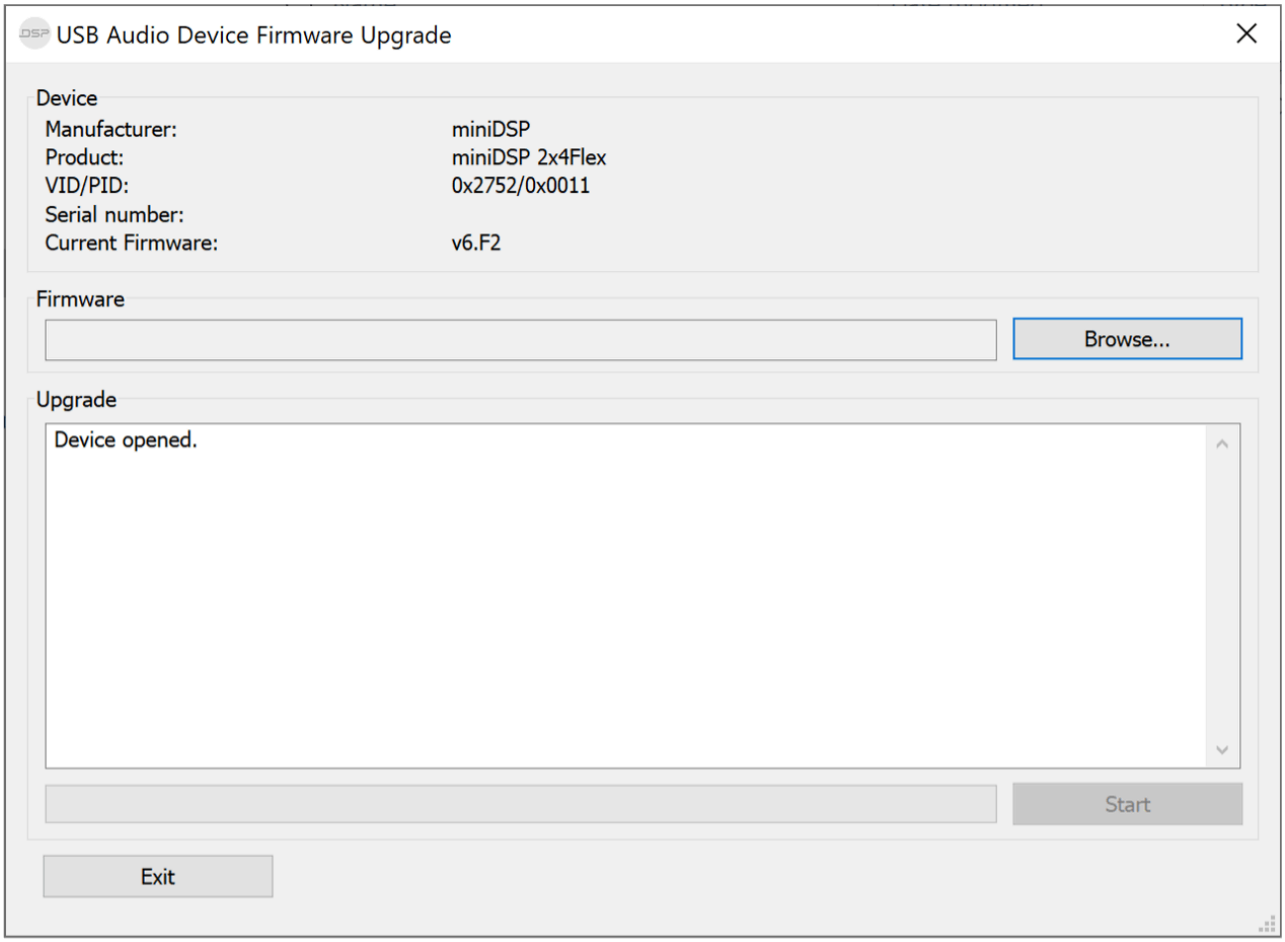
Double-click on the **miniDSPUAC2Dfu.exe** program to run it.

For macOS, navigate to:

XMOS Firmware ⟩ Firmware_Upgrade_Tools ⟩ Mac

Double-click on the **miniDSP USB DFU.app** program to run it.

3. The firmware update utility will start:



4. Click on **Browse** and select the firmware file from the **XMOS_Firmware** folder of the migration pack. It will have a name like "SHD_Series_XMOS_v1.50_Up.bin." (The version number embedded in the file name may change.)

> **Warning**
>
> Do not proceed if you cannot locate the correct firmware file. The name of the firmware file **must** begin with "SHD_Series_XMOS" or you could damage your SHD.

5. Click on the **Start** button. You will see a progress bar as the upgrade proceeds.

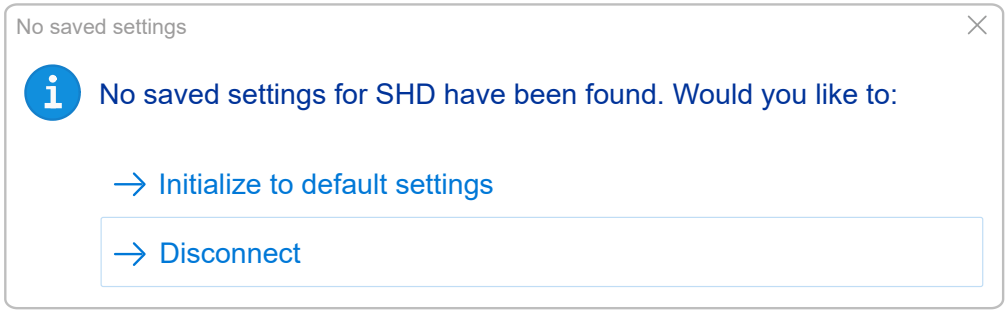
> **Warning**
>
> DO NOT DISCONNECT THE USB CABLE OR POWER FROM THE SHD WHILE FIRMWARE UPGRADE IS IN PROGRESS. DOING SO MAY “BRICK” YOUR SHD.

6. Once the firmware upgrade completes, you will see a message that the upgrade completed successfully. Click on **Exit**.

Now that your SHD firmware has been updated to a version that is compatible with Device Console, future firmware upgrades can be done directly from within Device Console.

6. Migrate your configuration presets

Existing presets must be imported manually into Device Console. Locate your SHD on the **Discover Devices** page and click on it. Device Console will offer this prompt:



Click on **Initialize to default settings**. Then use the import function of Device Console to import the existing presets one by one. These can be found in your Documents folder, at the path:

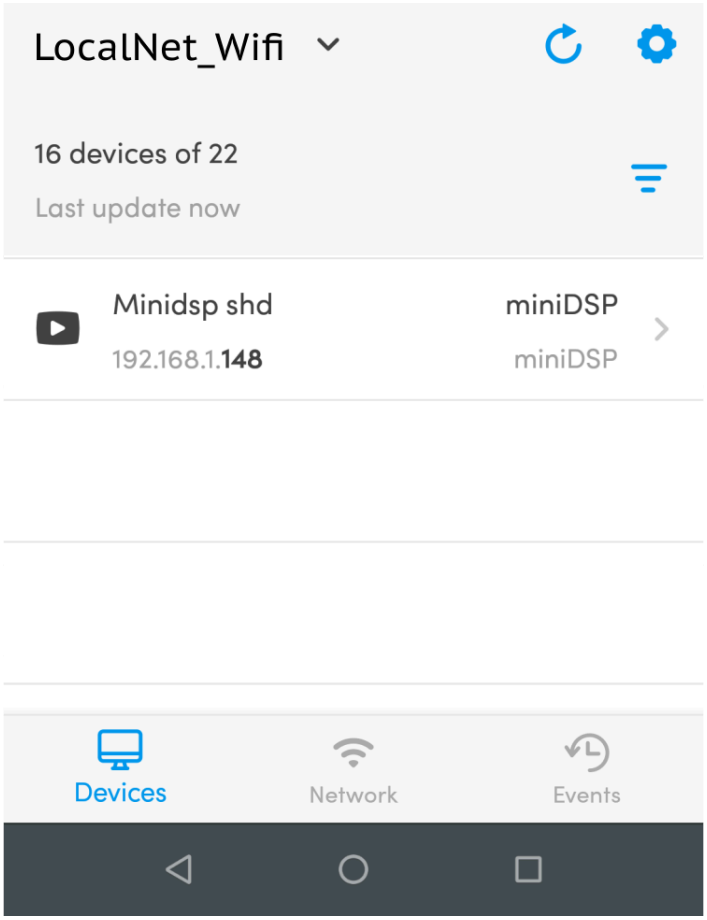
Documents ⟩ MiniDSP ⟩ SHD ⟩ settings

For information on the import function, see Importing and exporting.

Finding the IP address

If the URLs given in Network audio don't connect to the miniDSP SHD\'s web interface, you can connect using its IP address.

Locating the miniDSP SHD with a network scanner

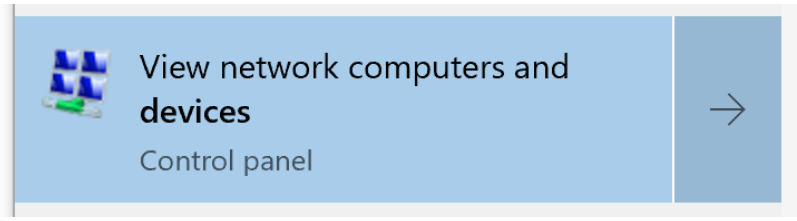


You can find the IP address of the miniDSP SHD with a network scanner. A popular scanner is the Fing App (https://www.fing.com/products/fing-app) , which is available for Android and iOS.

Once you have found the IP address, enter the IP address instead of the name into the web browser address bar. For example: `http://192.168.1.148` .

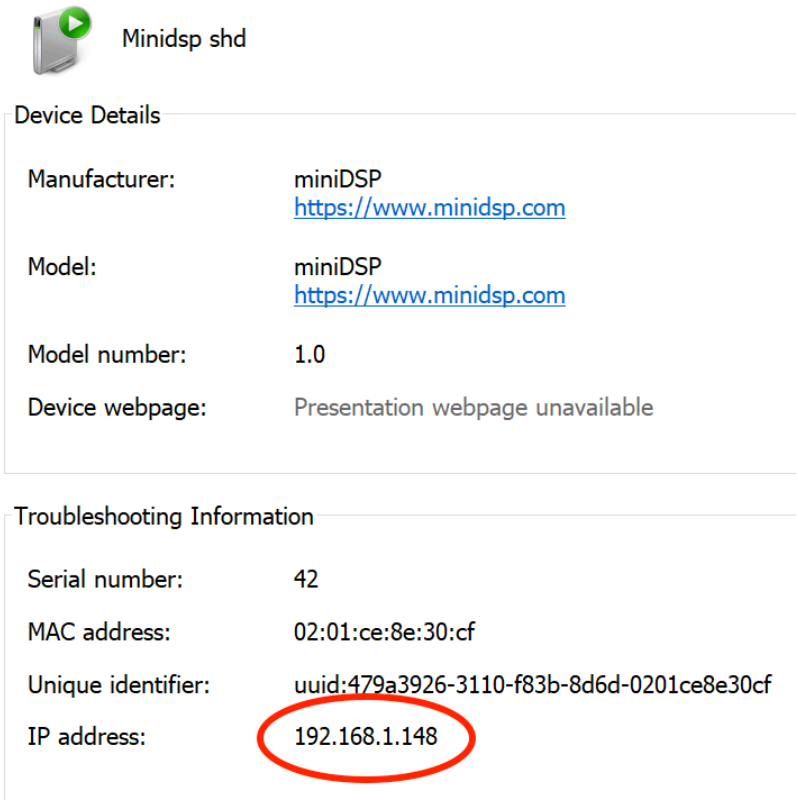
Locating the miniDSP SHD in Windows 10

In Windows 10, click on the search button and type "devices". Click on "View network computers and devices":



The miniDSP SHD will be visible in the Media Devices section:

Click on it to observe the Properties window. Locate the IP address near the bottom of the window:



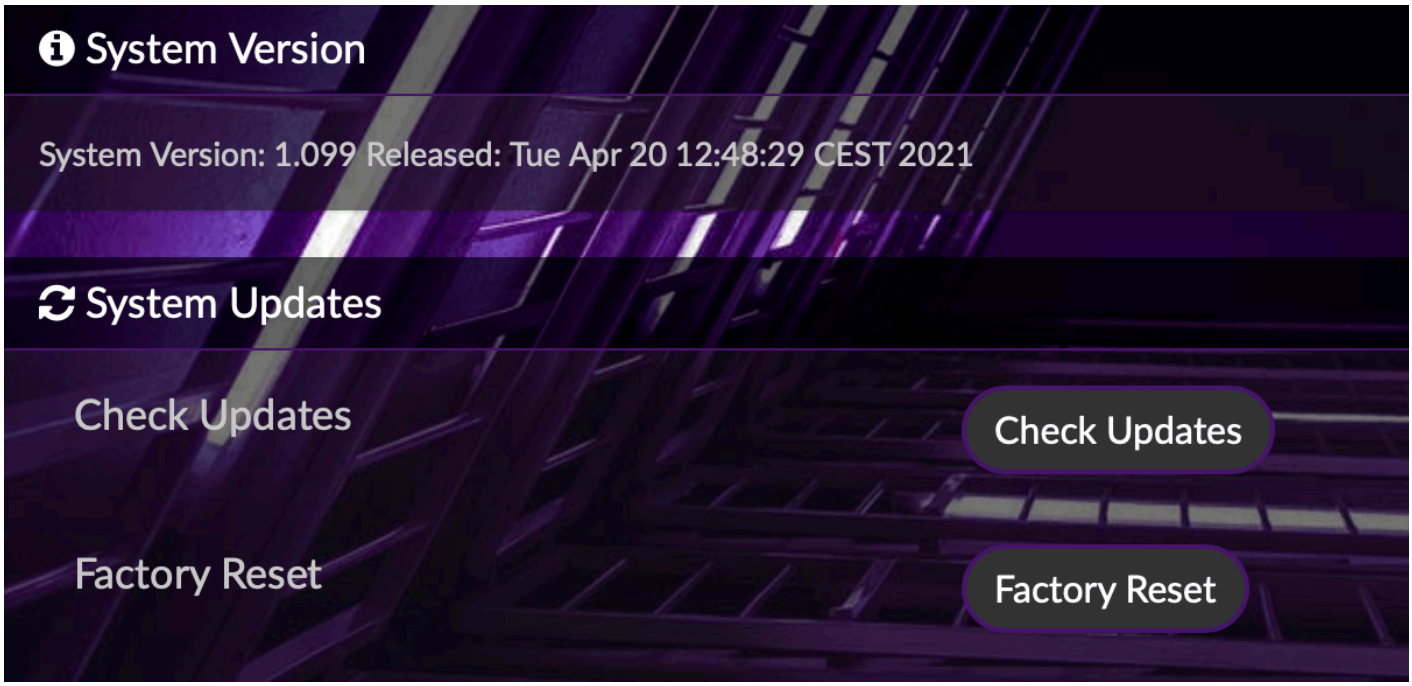
In the web browser address bar, enter the IP address instead of the name. For example: `http://192.168.1.148`.

Volumio reset

Volumio settings/factory reset

There are two types of reset for Volumio. One reverts to the default settings, and one restores the complete Volumio installation to the version that was delivered from the factory. Use the second version if your Volumio installation has become corrupted and you are no longer able to access the Volumio web interface. Neither version has any effect on the plugin settings or Dirac Live calibration.

Factory reset (settings only)



In the Volumio web interface, navigate to Settings then System. Scroll down to the System Version section and click on the Factory Reset button. The Volumio web interface will become unresponsive for a minute or so while the settings are reset. You will need to enter all your settings again.

Factory reset (settings and installation)

Use this method if Volumio has become corrupted and you are unable to access the Volumio web interface.

1. Insert a blank USB stick into your computer. Make sure it is formatted in FAT32 format.
2. In your web browser, go to the location http://repo.volumio.org/Primo/factory_reset (https://repo.volumio.org/Primo/factory_reset) . Save the file download to the USB stick and eject the stick from your computer. Do not rename or modify the file.
3. Power off your miniDSP SHD and insert the USB stick. Power it on again.

4. Volumio will revert to the factory version. This can take up to ten minutes, during which time the Volumio web interface will be unresponsive.
5. When the Volumio web interface responds again, proceed through the setup wizard. Go to Settings then System. Scroll down to the System Version section and click on the Check Updates button. Update your Volumio to the latest version.
6. Update any remaining settings to how you had it before the reset.

> **Tip**
>
> If you had renamed your system in the Volumio settings, you will need to access the web interface using the default name.

The factory_reset file is removed from the USB stick during this process. If you want to do the reset again, you will need to copy the file to the USB stick again.

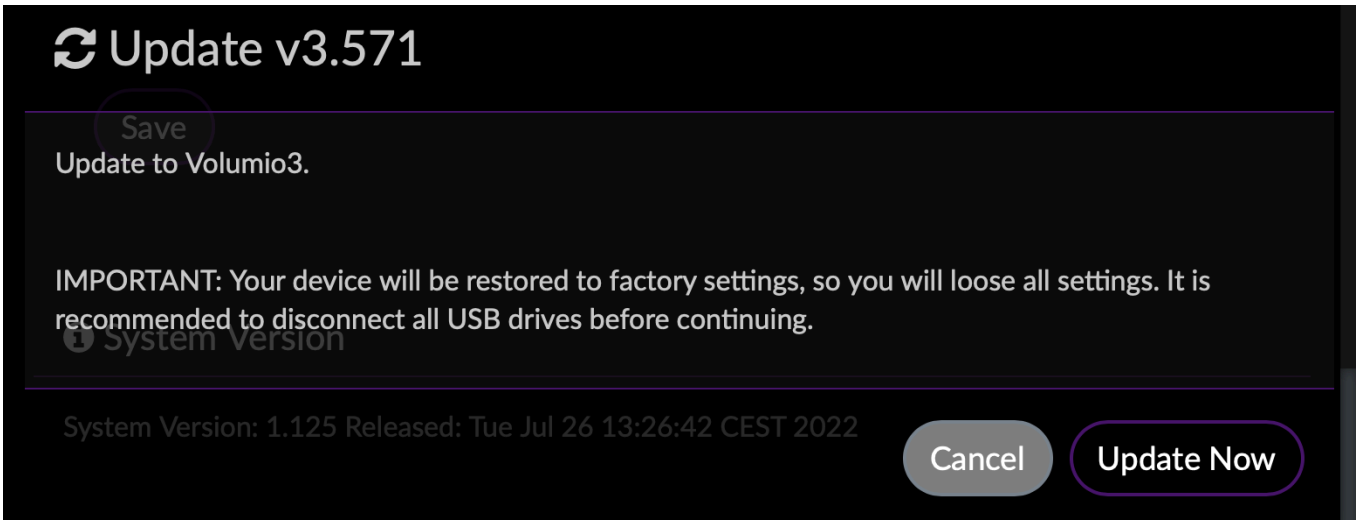
Updating Volumio

Volumio 2 to Volumio 3

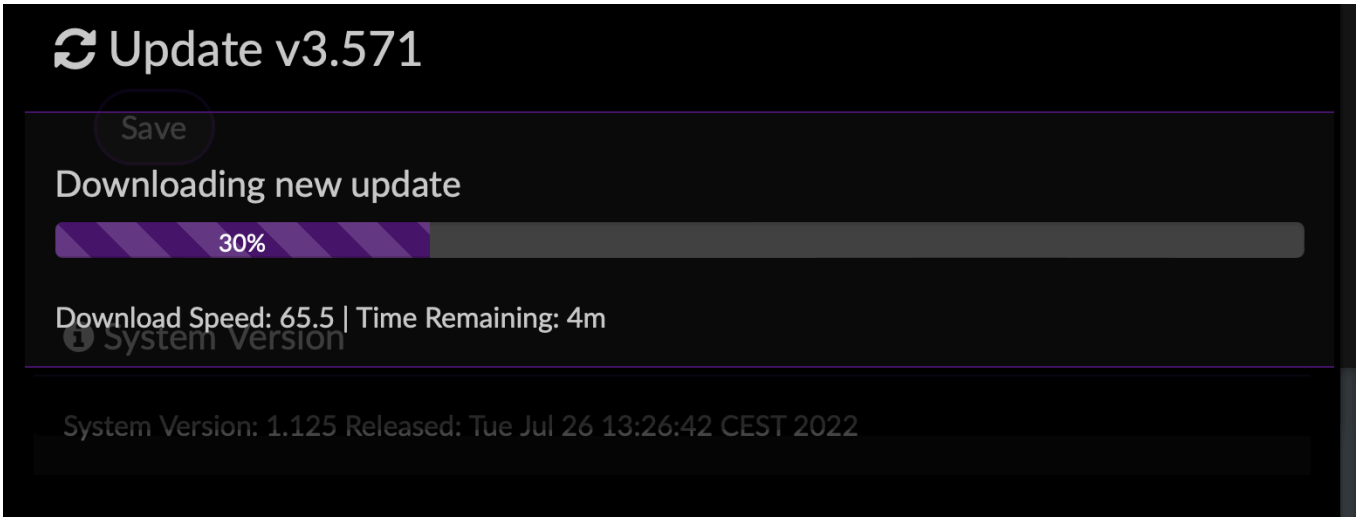
Volumio 3 was released for OTA (over-the-air) update in November 2023. This is a **major update**. Make sure to follow the instructions below.

> ⚠ **Warning**
>
> **When updating from Volumio 2 to Volumio 3.**
>
> Volumio 3 is a major OS update, so we have to perform a clean install to guarantee 100% safe operation. This means that you will lose all your Volumio settings, configuration, and playlists. (Music files will not be deleted. DSP configurations and Dirac Live filters will also not be affected.) **Be sure to write down any settings that you will need BEFORE you start the update.** When the update completes, you will have a "fresh" system that you will then need to configure.

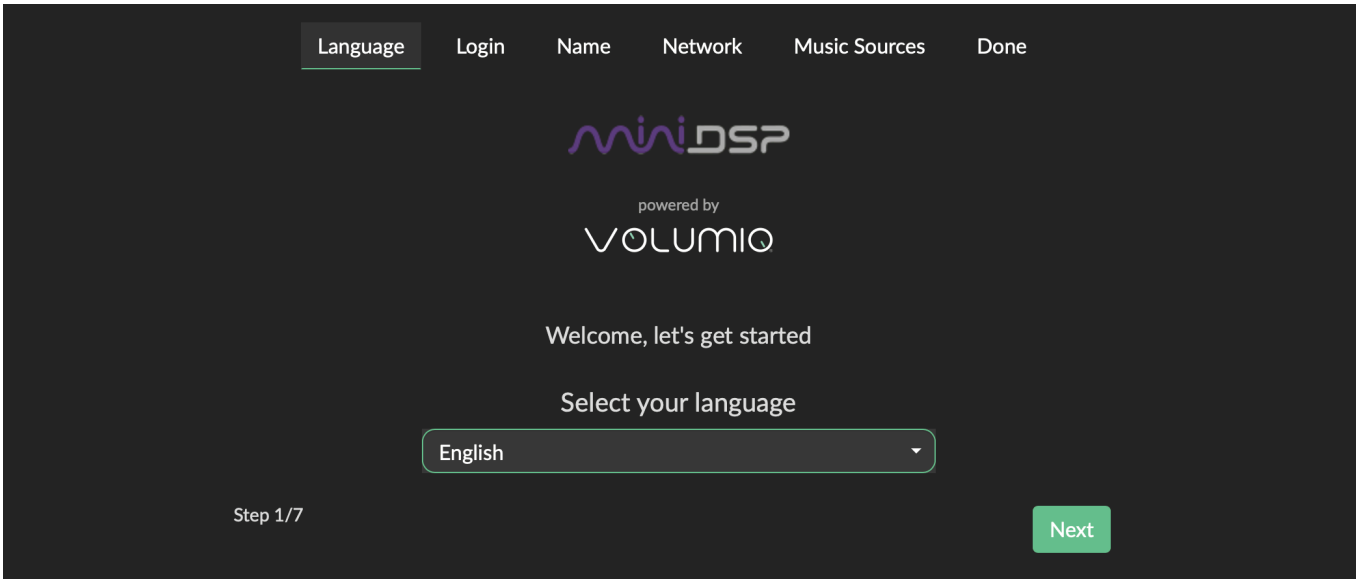
1. Log into the Volumio web interface.
2. Make sure that you have written down or taken a screenshot of all settings that you have made in the interface. For example, the path of your NAS, any settings on the Playback options page, and so on.
3. If you have a USB stick plugged in, remove it now.
4. Navigate to the System settings page and click on **Check Update**. You will see the update notice as follows.



5. Click on **Update Now**. A progress bar will update as the update proceeds. *Do not unplug or power off your SHD while the update is in progress.*



6. When the update completes, Volumio will run the setup wizard:



7. Proceed through the wizard as described in The Volumio setup wizard.
8. Use the Volumio interface to restore your settings.

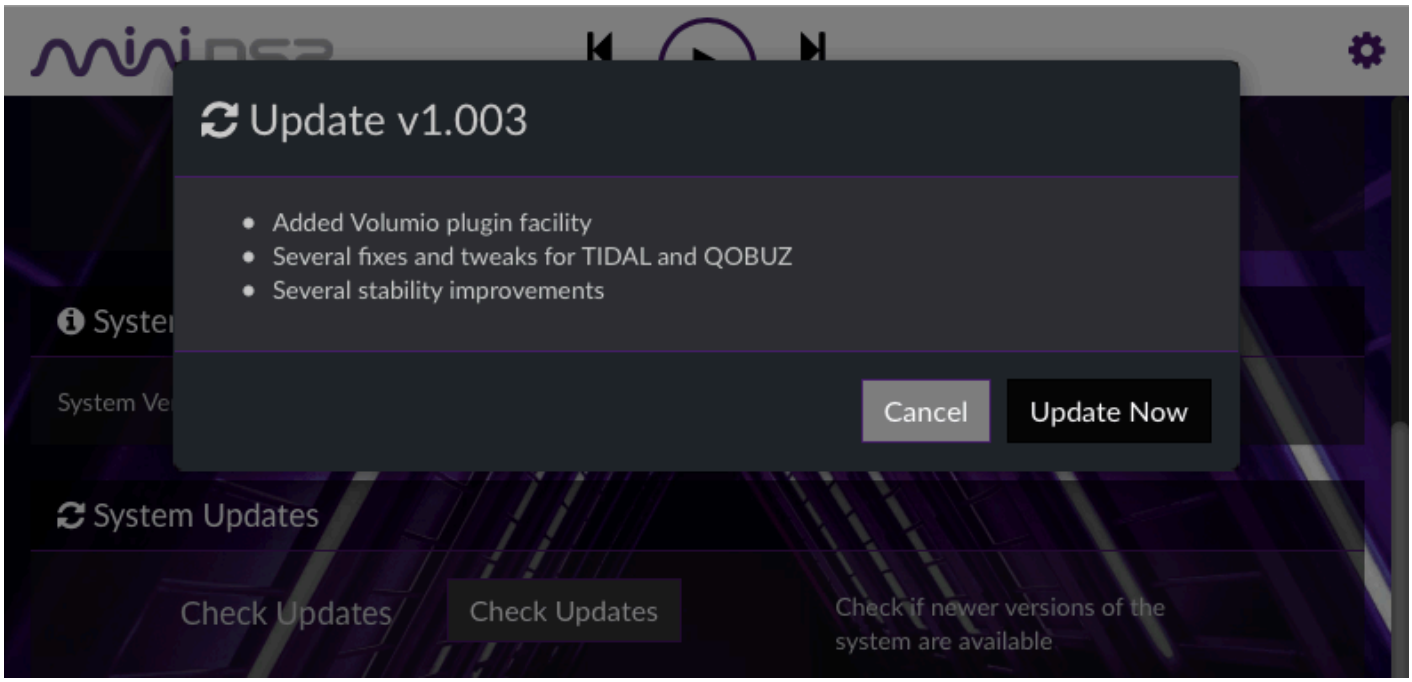
> **Tip**
>
> By default, the network name of your SHD will be reset to the default *minidsp-shd* or *minidsp-shd.local*. If you change this in the setup wizard, be sure to restart Volumio from the interface after completing the wizard.

> **Tip**
>
> If you have previously accessed the SHD by its IP address and cannot connect, check whether its IP address has changed. For more information, see Finding the IP address.

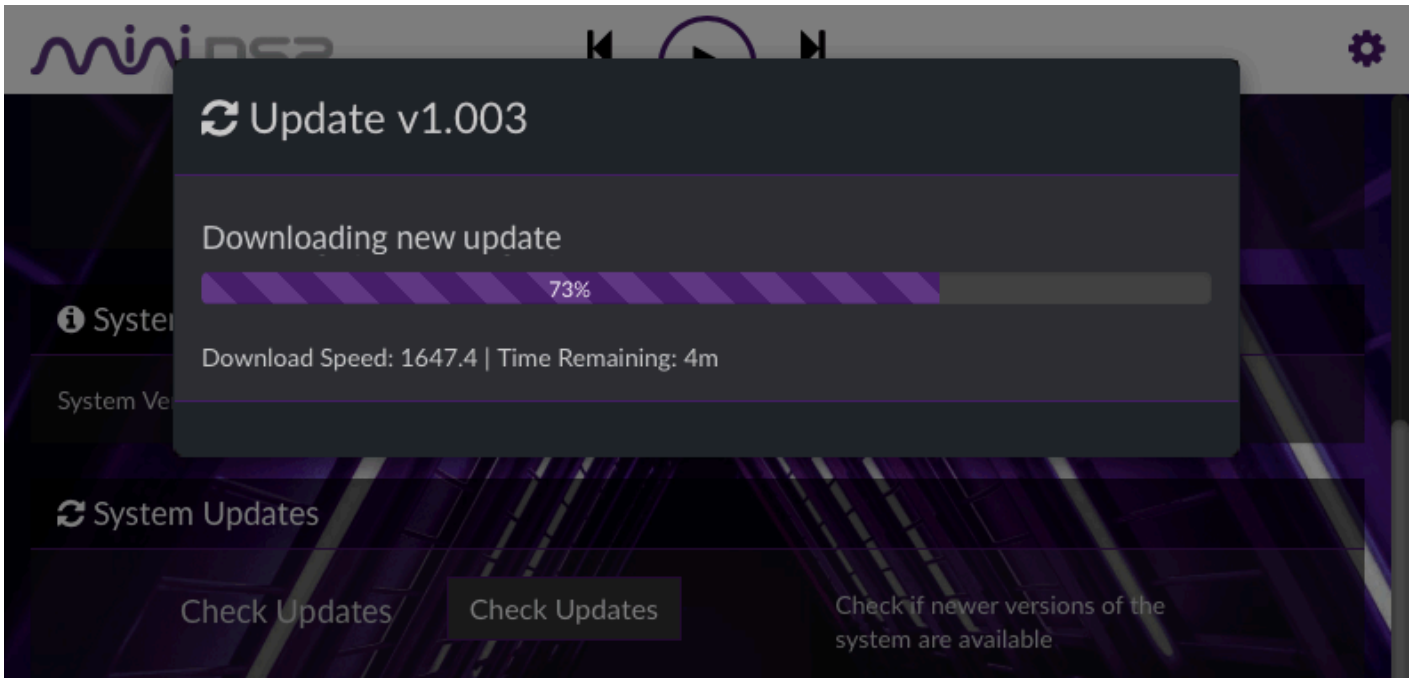
Minor update

> **Info**
>
> A minor update is an update within the same major version, such as from Volumio 3.1 to Volumio 3.2 (the major version in this example is Volumio 3).

To check for an update to the Volumio software, open the Volumio web interface. Navigate to the System settings page and click on **Check Update**. If an update is available, you will see the details of the update, like this:



Click on Update Now. You will see a progress bar:



When the update completes, Volumio will automatically restart. After the webpage returns, it is important to **refresh the webpage in your browser**. This ensures that any updates to the user interface itself are updated in your browser.

Troubleshooting

No sound during playback

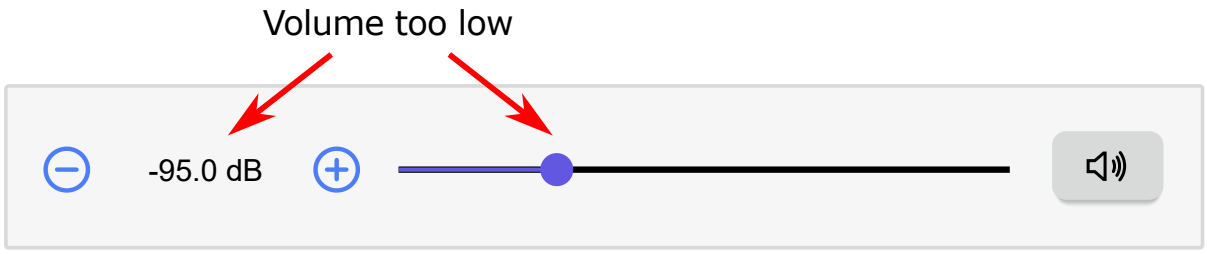
The most common issues

The most common reasons for the "no sound" tickets we receive at the miniDSP Support department are the following.

Master volume

Check that the master volume control is set to a reasonable level. The master volume can be reset by the Dirac Live app or by AutoEQ, so it's important to check the master volume again after using either of them.

This is too low for normal listening:



This is more realistic for normal listening:

Mute

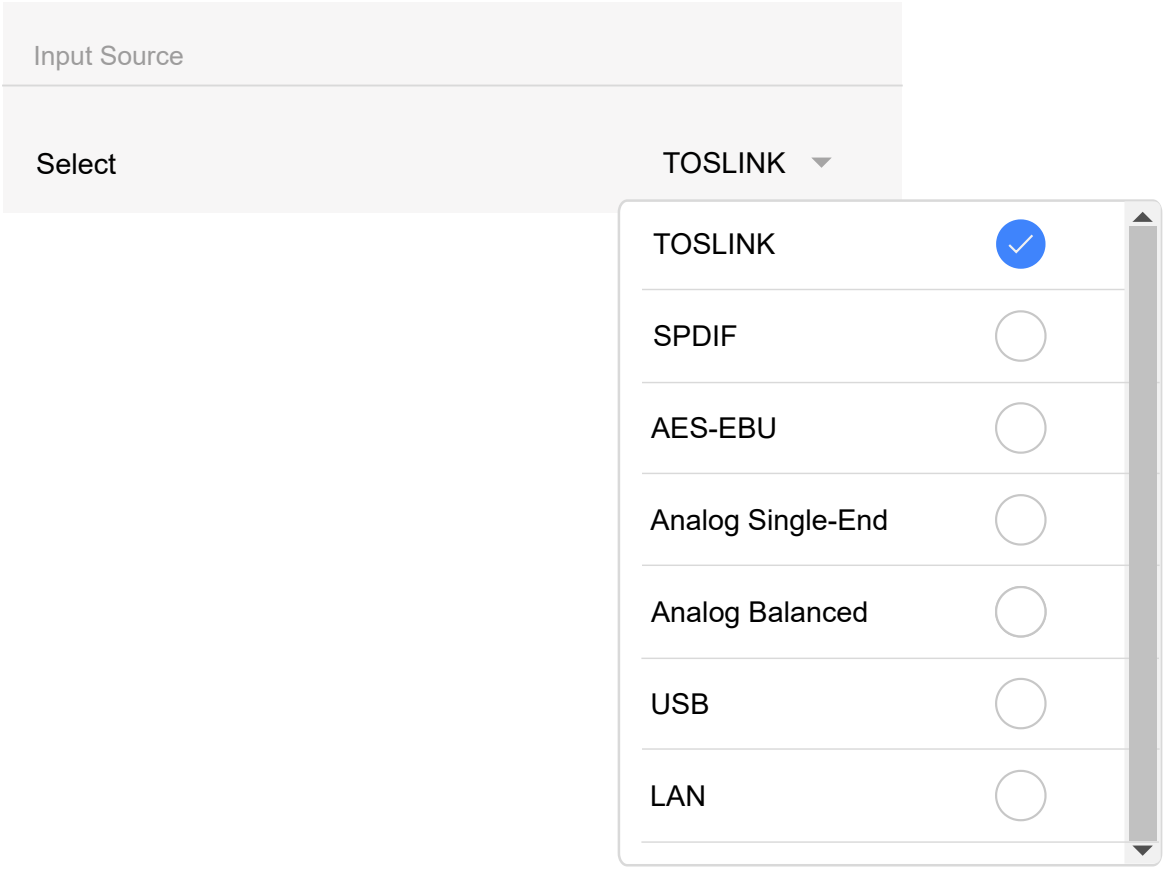
Check that mute is not on.

Other common issues

If the above doesn't produce sound, check these items next.

Input source

Check that you have the correct input source selected, for example:



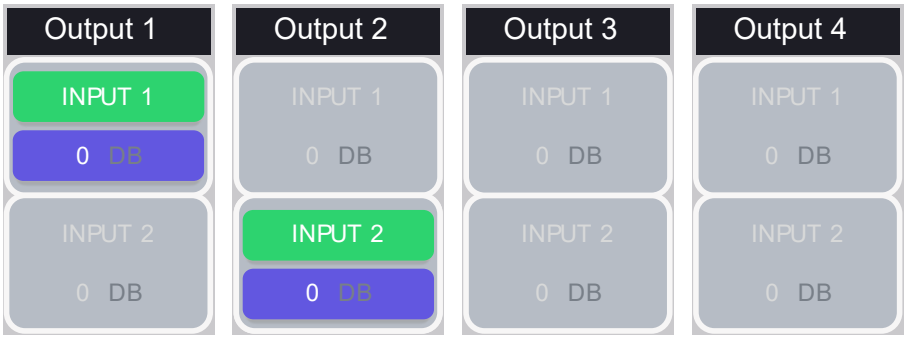
You should now see level on the input meters:

If there is no signal level on the input meters, go to the detailed checklist.

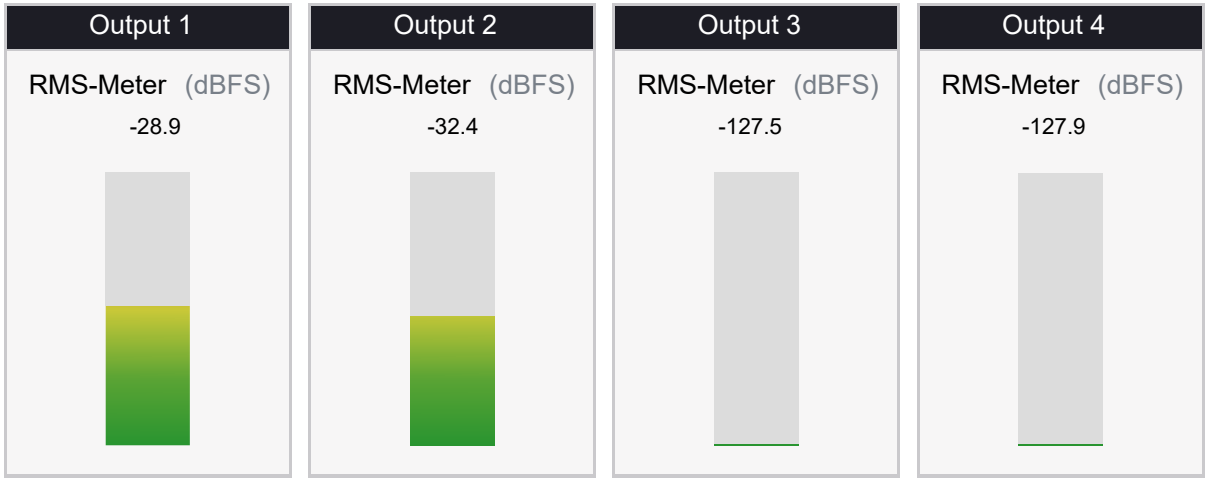
If there is signal level on the input meters but still no sound, go to the next step.

Signal routing

If there is signal on the input meters but none on the output meters, check your signal routing. For example, this is the default "straight through" routing:



You should now see level on the output meters:



Check your master volume and mute again, and you should have sound. If not, go to the detailed checklist.

Detailed checklist

If the above basic checks don't result in sound, work through the following items in order. Be sure to *check every single item*.

> **Info**
>
> The checkboxes are not persistent. That is, they will be unchecked if you navigate away from this page and back again. They are simply there to help you make sure you get every one of them.

0. Preparation

- *Turn off* your amplification until you get to the step that says to turn it on.
- If you have the Dirac Live app open, quit it and return to miniDSP Device Console.
- Use the remote control or front panel knob to turn down the master volume.

1. Check the input meters

- Play a music signal, or pink noise from the REW signal generator.
- Check that the input meters have signal.

If there is no signal on the input meters:

- If the source has a volume control, check that its volume is turned up.
- If the source has multiple outputs that can be selected, check that the correct output is selected.
- Check that the cables connected to the source outputs are plugged into the correct output plugs.
- Check that the cables connected to the SHD inputs are plugged into the correct input plugs. Be sure to check the actual numbering on the rear panel.
- Check that you have the correct input source selected on the SHD.

2. Check the output meters

If there is signal on the input meters but no signal on the output meters:

- Turn up the master volume control. (This is needed because the output meters show the level *after* volume adjustment. Make sure your amps are turned off.)
- Check that the SHD is not muted.
- Check your Routing and make sure that you are routing the inputs through to the connected outputs.
- Check your crossover settings. (For example, if you have a high pass crossover filter but are generating a subwoofer-frequency test signal, there will be no output signal.)

C. Check output connections

If you have signal on the output meters:

- Turn the master volume down.
- Turn your amplification back on.
- Gradually turn up the master volume.

If there is still no sound:

- Turn your amplification off again.
- Check that the cables connected to the SHD outputs are plugged into the correct output plugs. Be sure to check the actual numbering on the rear panel.

- Check that the cables connected to the amplifier inputs are plugged into the correct input plugs.
- Turn your amplification back on.
- Check that amplifier(s) are not muted or turned down.

Some outputs produce sound and some do not

If some outputs produce sound and some don't, check your routing and all of your crossover settings. For example, in a multi-subwoofer configuration, some outputs will not produce sound if there are high pass filters active.

Strange soundstage

If the soundstage width is narrow, check that you have not summed left and right input channels and routed the sum to left and right speakers. This will result in a mono signal and hence a narrow soundstage.

If the soundstage is "weird", check the routing and crossover settings and make sure that left and right channels are consistent.

If you are implementing an active speaker, double-check that every output goes to the correct driver. This can be done by playing a test signal (music or pink noise) at low volume, muting all outputs, then unmuting each output one at a time.

USB-related issues

A poor or marginal USB connection can cause various issues, such as:

- Inability to detect a connected device
- Failure to complete a firmware upgrade

If you experience this type of issue:

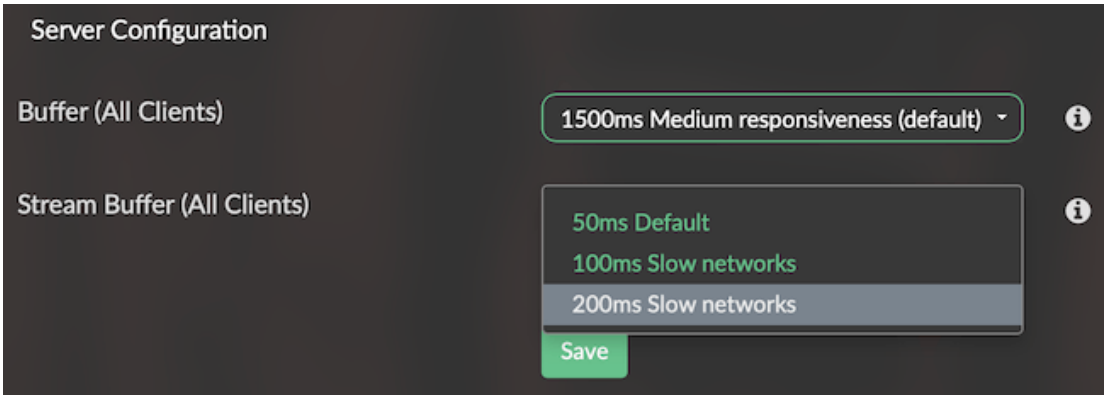
1. Try a different USB cable. (Note that a marginal cable can work normally but fail to complete a firmware upgrade, for example.)
2. If you are using a long USB cable, replace it with a short cable. If you need a long length after testing with a short cable, use an **active** USB cable extension.
3. Try a different USB port on your computer.
4. If you have any hubs or extensions between the SHD and your computer, try removing them.

Network audio dropouts

In the Volumio web interface, go to Playback Options → General Playback Options and increase Audio Buffer Size:

If you are not using multiroom playback, try disabling it in My Music → Functionalities Control:

If you are using multiroom playback, go to My Music → Functionalities Control, scroll down to Multiroom Playback and click on the **Settings** button. Try increasing the buffer sizes in the settings:

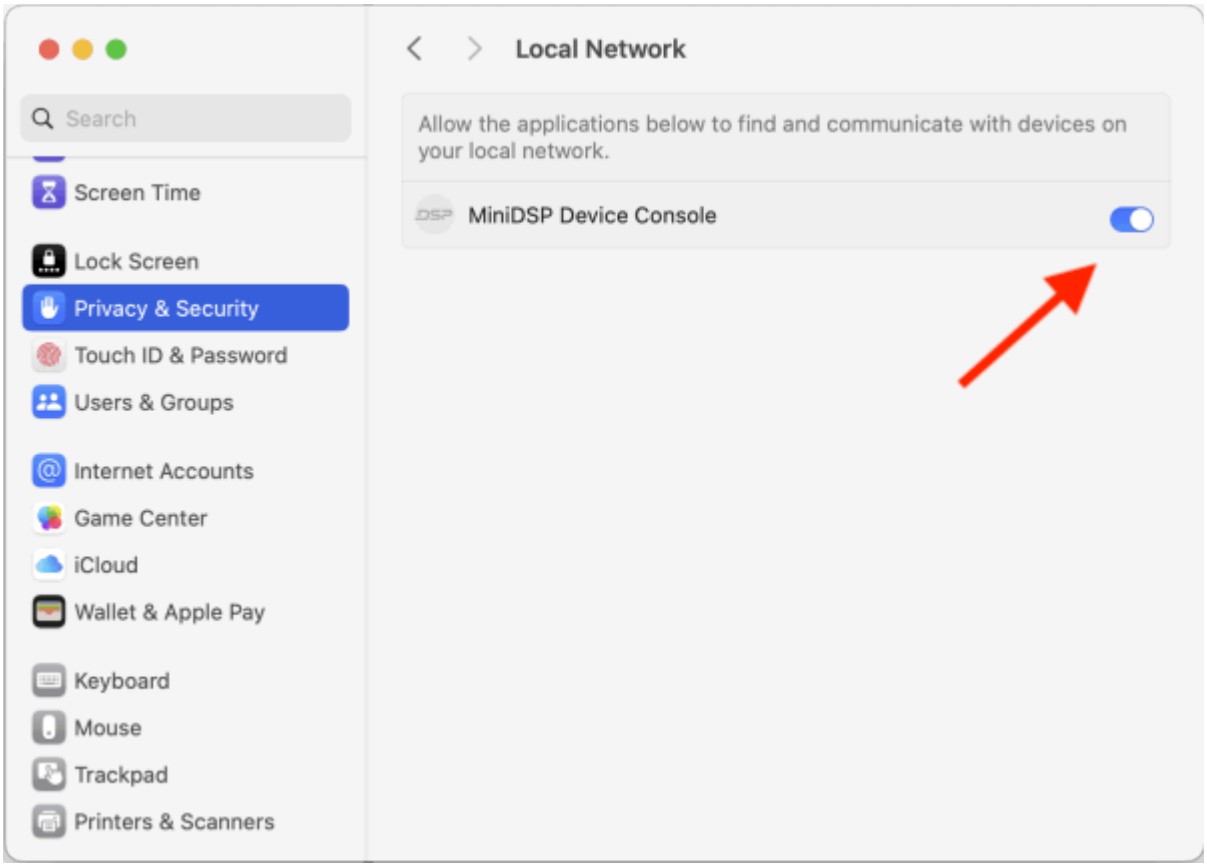


If you are using Wi-Fi, one option is to switch to a wired (Ethernet) connection if possible. Alternatively, investigate whether the location of your SHD has good signal strength and whether the Wi-Fi network you are using is congested.

Network access errors (macOS Sequoia and later)

If you get an error message such as "Failure searching for devices" or other network access errors, it may be because you have not enabled local network access for Device Console.

To check and correct this, open System Settings, scroll down on the left sidebar and select **Privacy & Security**, then scroll down on the right and click on **Local Network**. If miniDSP Device Console is not enabled, enable it here:



Dirac Live-related audio issues

No sound during volume calibration

If you get no sound while on the Measurement Levels tab of Dirac Live, first make sure that you increase the volume slider in the UI (the leftmost one).

If there is still no sound, quit Dirac Live and return to Device Console. Then work through the steps in the No sound during playback section above.

Distorted sound during playback

If audio playback is distorted, you may have too much gain internal to the DSP. Dirac Live can apply up to 10 dB of gain, so the output level should be kept lower than -10 dB to *guarantee* that there is no distortion with a full-scale input signal.

This issue typically occurs when volume control is being done downstream of the miniDSP processor. If so, set the processor master volume at -10 dB, and then use the downstream equipment to control volume.

Dirac Live-related connectivity issues

> **Tip**
>
> If you are experiencing any connectivity issues, the **first thing** to do is double-check that the Dirac Live application, the miniDSP Device Console and your processor's firmware are up to date.

No Internet connection

Various components of the software require an Internet connection. In particular:

- The Dirac Live application may refuse to generate filters or reload saved projects if it cannot connect to the Dirac Research servers.

In the event that the software is not operating correctly, check that your computer is connected to the Internet and try again.

Failure searching for devices (macOS Sequoia and later)

If, when starting Dirac Live from Device Console, you receive the error message "Failure searching for devices", it may be because you have not enabled local network access for Device Console.

To resolve this, see Network access errors (macOS Sequoia and later) above.

The miniDSP SHD is not detected by Dirac Live

If the Dirac Live application does not find the miniDSP SHD when you start it, work through the following to identify the issue.

Anti-virus conflict

Some anti-virus software can interfere with communication between Dirac Live and the processor. Follow these steps:

1. Disable your anti-virus software and restart Device Console and Dirac Live.
2. If Dirac Live is now able to detect the SHD, check the documentation for your anti-virus to see if there's a way to allow Dirac Live full access to the Internet.
3. Otherwise, you may need to disable your anti-virus temporarily when running Dirac Live with the SHD.

> **Note**
>
> Some anti-virus software includes a built-in firewall component. This firewall may be the cause of the issue, so be sure to check for the presence of a separate firewall installed with the anti-virus software.

Port conflict

The Dirac Live application use network ports 11113, 11115, 11117, 5000, and 8080. The last two in particular are needed for the bridging app to communicate between Dirac Live and the miniDSP processor.

If the miniDSP processor is not detected:

1. Double-check the USB cabling from your computer to the processor. If you are using extenders or hubs, remove them and make a short direct connection. Try different USB ports on your computer.
2. Check that your computer's firewall isn't blocking any of the ports listed above.
3. Check that other applications aren't using these ports.

   a. On Windows 10, open a command prompt and type the following commands:

   ```
   netstat -ano | findstr 8080
   netstat -ano | findstr 5000
   ```

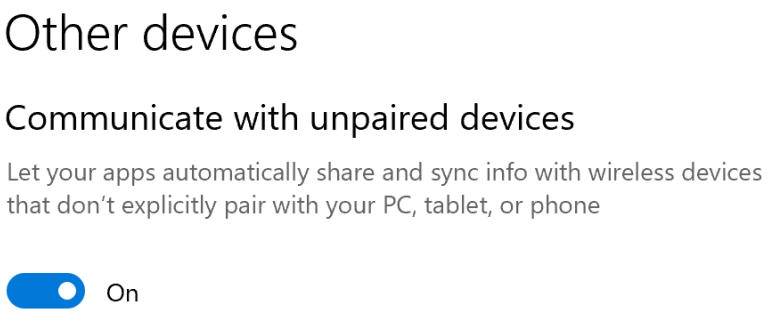
   b. On macOS, open Terminal and type the following commands:

   ```
   sudo lsof -n -i4TCP:8080 | grep LISTEN
   sudo lsof -n -i4TCP:5000 | grep LISTEN
   ```

If there is no output, the ports are not in use. If there is output, then try to close the application that is using them. Typically, software that provides a local web server is likely to be the one blocking port 8080.

Unpaired devices (Windows 10)

Some customers have reported that changing the following setting enabled Dirac Live to find their processor. Go to Settings -> Privacy -> Other Devices and enable "Communicate with unpaired devices."



Obtaining support

If you are experiencing issues with your miniDSP SHD that are not resolved by this manual and by following the troubleshooting steps above:

1. Check the miniDSP community forum (https://www.minidsp.com/community/) to see if this issue has already been raised and a solution provided.
2. Contact miniDSP via the support portal at support.minidsp.com (https://support.minidsp.com/support/home) with:

   a. A clear explanation of the symptoms you are seeing.

   b. A description of troubleshooting performed and your results.

   c. The firmware versions obtained from the Display Versions button in Device Console.

   d. (Recommended) For quickest resolution of your issue, include the current program snapshot. This can be obtained from the Device Console Settings screen.

Open source licenses

The Volumio portion of the miniDSP SHD runs on a separate ARM CPU and is subject to various open-source licenses. To view the complete list of open source licenses and credits, connect to the web interface using your web browser and select System from the menu, then "Credits and Open Source Licenses."

If you would like a copy of the GPL v2.0 source code contained in this product shipped on a DVD, you may obtain the complete corresponding source code from us for a period of three years after our last shipment of this product for a charge of $20 no more than the cost of preparing and mailing a DVD to you. Please contact info@minidsp.com. This offer is valid to anyone in receipt of this information.