

# Syne

## Modular Additive Synthesis

### User Guide

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# Glossary

**Additive synthesis:** most directly generating sound by adding the output of multiple sine wave generators

**DAW:** Digital Audio Workstation, the host application where VST and Audio Unit plugins are loaded.

**Fundamental frequency:** the lowest frequency sinusoidal in the sum which is also perceived as the loudest, the ear identifies it as the specific pitch of the musical tone

**Harmonic or harmonic partials:** partials that are positive integer multiples of a common fundamental frequency

**Inharmonicity:** a measure of the deviation of a partial from the closest ideal harmonic

**MPE:** MIDI Polyphonic Expression. This specification is designed for MIDI controllers that allow the performer to vary the pitch and timbre of individual notes while playing polyphonically.

**Partial:** any of the sine waves of which a complex tone is composed, not necessarily with an integer multiple of the lowest harmonic.

**Portamento:** pitch sliding from one note to another

# Introduction

We attempted to do the almost impossible. A long time dream to have a synthesizer that sounds analog, extremely flexible and light on the CPU at the same time has come true.

Additive synthesis was a good candidate. It is trivially band-limited simply by not generating harmonics higher than half the sampling rate, so an aliasing filter is not needed (=sounds analog). It provides complete control of each partial (=extremely flexible), but it is very processor intensive. Calculating each sound sample requires summing hundreds or thousands of oscillators depending on the sound complexity and polyphony. To make a long story short we managed to make an engine capable of rendering 20000 partials on an older processor that supports SSE3, and well over 40000 on a newer Apple M1 or Intel processor with AVX2 support.

## **Syne** features:

- a very fast additive synth engine that allows complex sounds and/or high polyphony
- fully modular architecture with more than 30 modules
- cleanest possible sound, no need to use an aliasing filter or other hacks
- support for microtonal scales: importing Scala (.SCL) and AnaMark (.TUN) files, editing tunings is possible, tuning saved in the preset or as a separate file
- the simplest UI where zooming in shows more details
- wavetable file import. The wavetables are not just spectral interpolated, but kept in the spectral domain all the time during synthesis.
- wavetable generation for a single click
- all parameters can be automated (internally or from the plug-in host)
- MIDI MPE support
- simple activation. No internet connection is required for activation or operation

**Syne** is available for Windows and macOS and comes as standalone, VST2.4, VST3 and AU (on macOS) versions.

# Getting started

## System requirements

### Windows

- Supported operating systems: Windows Vista/7/8/10 (32-bit or 64-bit)
- Intel/AMD processor 1.4 GHz minimum with at least SSE3 support
- For standalone: ASIO or Windows MME (ASIO compatible audio hardware required for low-latency operation)
- For VST2/VST3 plug-ins: a DAW supporting these plug-in formats

### macOS

- macOS 10.11 - 13 (latest update)
- Apple Silicon or Intel processor 1.4 GHz minimum with at least SSE3 support
- For VST2/VST3/AU plug-ins: a DAW supporting these plug-in formats

## Note on real-timeness

If you have many instances of **Syne**, or use a very complex sound with many thousands of partials, the CPU usage will increase accordingly. Thus, we cannot guarantee that **Syne** will work flawlessly in all use cases even if your system meets the minimum recommended system requirements.

## Note on the audio

**Syne** is inherently a single channel (mono) synthesizer that outputs 'dry' sound. Therefore it is strongly recommended to use your favourite stereo reverb on the output of **Syne**. The built-in 'Stereo Width' setting creates a wider image using the Haas Effect which is a technique that uses delay to create wider stereo images.



# MIDI Polyphonic Expression (MPE) support

**Syne** is capable of receiving MIDI events on any MIDI channels in polyphonic mode. Channel 1 is handled as the master channel, all other channels belong to the MPE lower zone. The MPE upper zone is not used.

MPE keyboards emit continuous "Channel Aftertouch" (sometimes called "Channel Pressure") and "CC 74: MPE Dimensions 5" events, as well as Pitch Bend events for each held note, which you can assign to controls in Syne. There are two kinds of pitch bends: note and zone bends. A pitch bend event arriving on the master channel (Channel 1) is applied to all sounding notes on other channels (zone bend). You set the master/zone bend range in the Syne preset, the note pitch bend range is always 48 semitones according to the MPE specification. Pitch bend, Channel Aftertouch and CC #74 is handled on both note-level and zone-level.

## Installation

The installation should be guided and straight-forward. You only have to follow the steps described in the installation program.

### Installation on Windows

The standalone application is installed in  
C:\Program Files\Syne

On 32-bit Windows the 32-bit executable is installed, on 64-bit Windows the 64-bit executable is installed.

VST2.4 (32-bit) plug-in location:

C:\Program Files (x86)\VSTPlugins\Syne\_Win32.dll

VST2.4 (64-bit) plug-in location:

C:\Program Files\VstPlugin\Syne\_x64.dll

You can override the VST2.4 plug-in paths during installation.

The VST3 plug-in is installed in

C:\Program Files\Common Files\VST3

, and in

C:\Program Files (x86)\Common Files\VST3  
on 64-bit Windows.

Presets are installed in your user documents folder:  
C:\Users\\Documents\Syne

After a successful installation it might be required to add the corresponding plug-in search path to your host software. Please refer to your DAWs manual to find out how to do that.

## Installation on macOS

The standalone application is installed in  
/Applications/Syne

VST2.4 plug-in location:  
/Library/Audio/Plug-Ins/VST/Syne.vst

VST3 plug-in location:  
/Library/Audio/Plug-Ins/VST3/Syne.vst3

Audio unit plug-in location:  
/Library/Audio/Plug-Ins/Components/Syne.component

Presets are installed in  
~/Documents/Syne

## Software activation

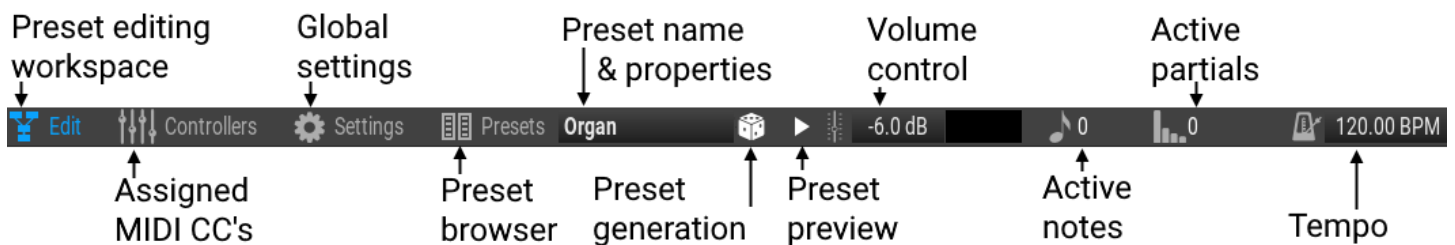
When first running **Syne**, you will be asked to type the license key that you received with your order. **No internet connection is required for activation or operation.**

# Overview

## User interface

The user interface consists of the status bar at the top and the workspace where you can modify existing sounds, or create new ones.



### The top bar





There are four main pages in the user interface:

- **Edit:** the main preset editing workspace where you create or edit a preset
- **Controllers:** all the assigned MIDI CC's and automations on one screen. You can easily replace any controllers here.
- **Settings:** audio, MIDI, tuning, miscellaneous and user interface settings. Audio and MIDI settings are available only in the standalone version.
- **Presets:** the presets browser

Clicking on the preset name opens a menu where you can edit preset properties, tags, voicing, save a preset, or create a new preset.

Click on  to display preset generation and mutation options. Ctrl-click on  will immediately generate a new preset.

The small “play”  button plays a few notes with the currently edited preset. You can set up preview options by right clicking on the  button.

It is important to set the preset volume properly to avoid clipping by clicking on the volume control.

The number of active notes (notes sounding) and active partials are displayed as well.

You can set the tempo in the standalone version. Plug-ins read the tempo from the host. It is not possible to override the tempo in this case.


## Parameter editing


Parameters have a standard look in the program:




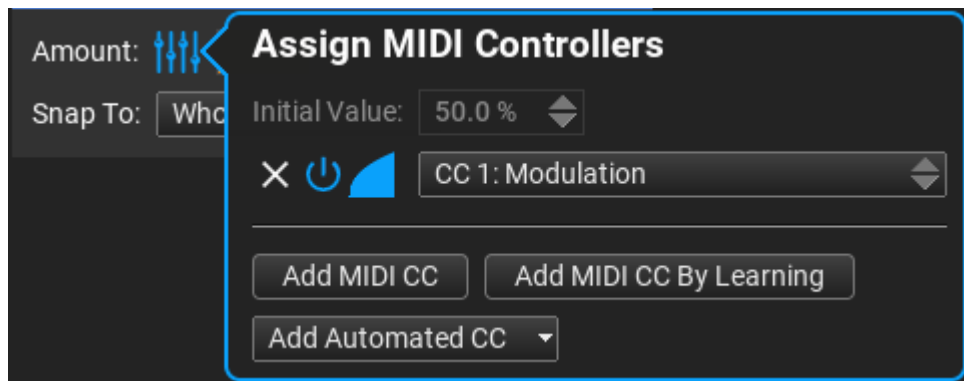
The slider can be controlled by dragging the mouse or by the mouse wheel. Holding the left Shift key will make fine adjustments, holding the right Shift will allow even finer adjustment of the parameter value. Double-clicking lets you set a value by typing from the computer keyboard.

You can assign MIDI CC's, automation (internal or from plug-in host), or even time for the parameter value by clicking on the small 'sliders' button. The button state indicates assigned controllers:

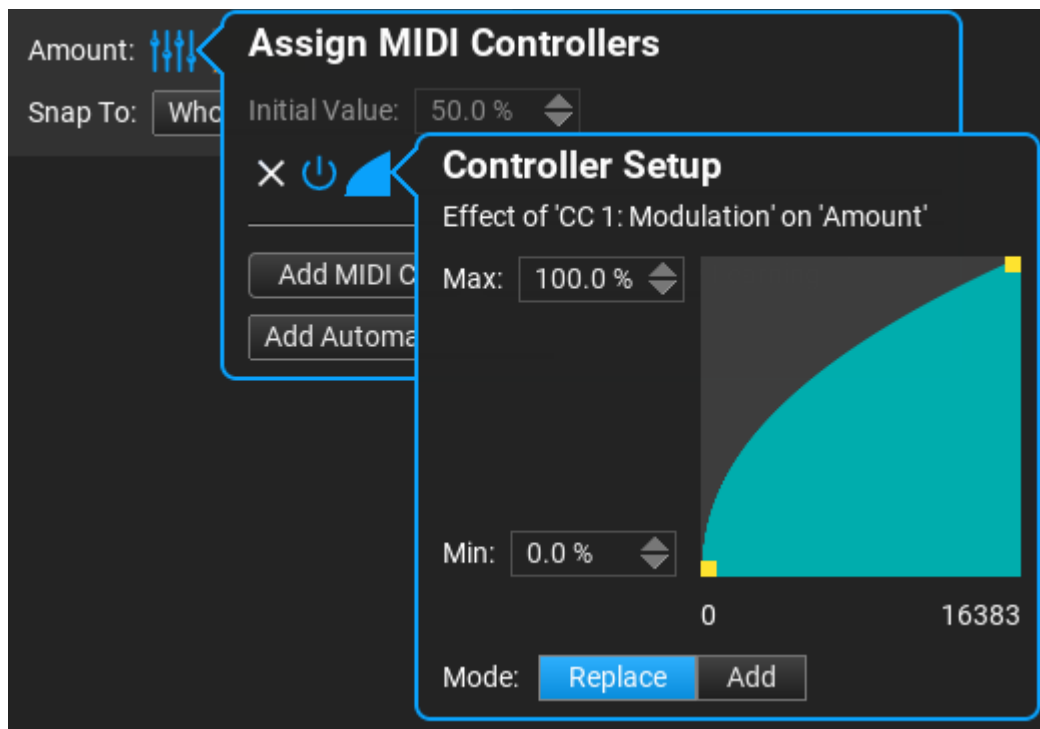
 : no controllers assigned. You can set the slider value.

 : one or more MIDI or automated parameters or passing time is assigned to this parameter. The slider turns orange, and it is not possible to edit the value.

Clicking on  will open the "Assign MIDI Controllers" menu, where you can set up one or more MIDI CC's, built-in functions (automated parameters), host automation (in the plug-ins) or you can use time for any parameter:

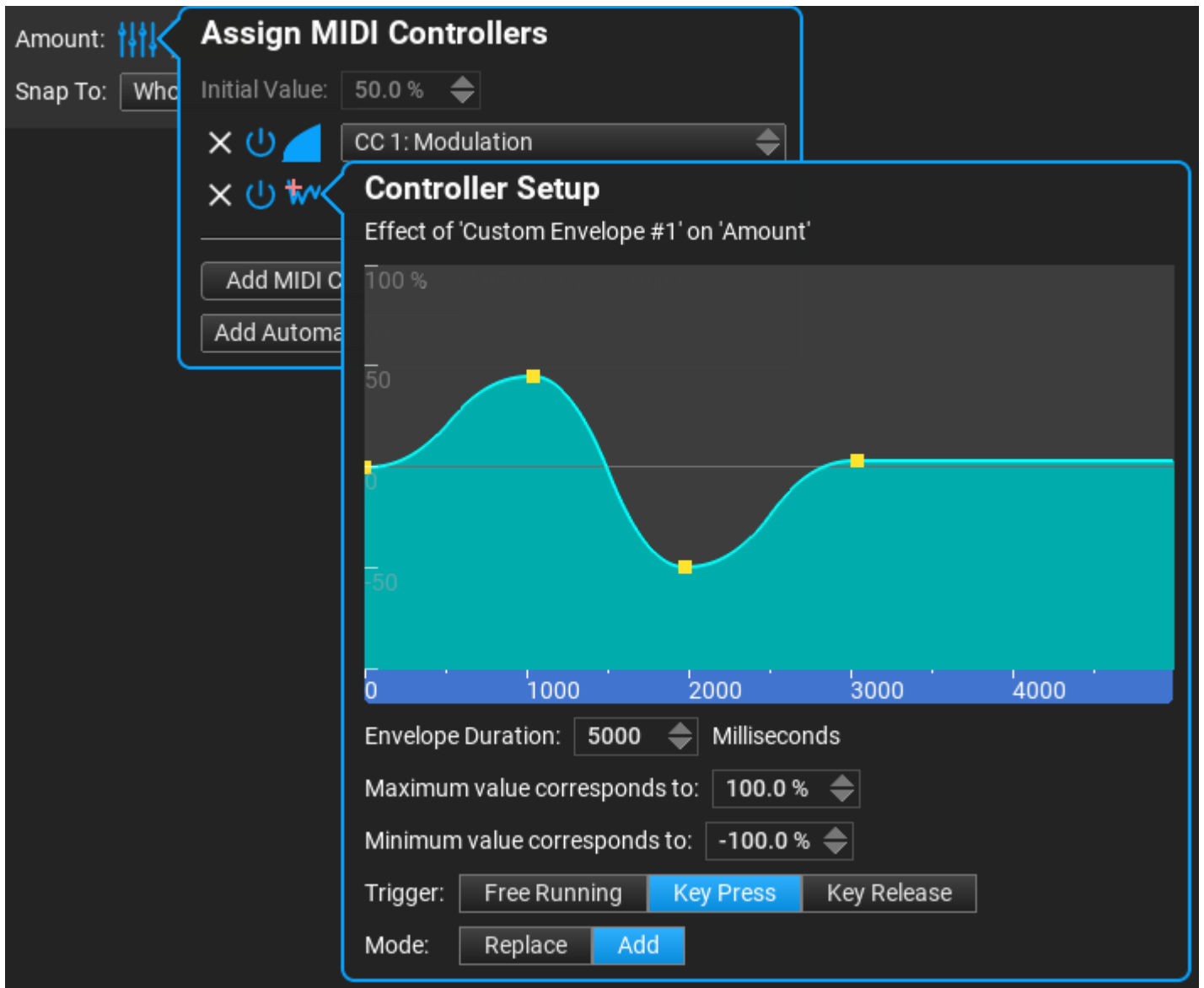


Click on “Add MIDI CC” or “Add MIDI CC By Learning” to assign a MIDI CC to the parameter. You can remove, mute or further edit the controller by clicking on the small icons next to the controller name. Clicking on the 3<sup>rd</sup> “envelope” icon lets you specify how the MIDI CC affects the parameter:



Several CC’s can be assigned to a single controller, each can replace or modify the parameter value. The controllers are evaluated from top to bottom. Typically the top controller either replaces or modifies the “initial value”, but all other controllers are in “Add” mode.

Custom envelopes may be used in the “Add Automation” menu:



You can assign “Passing Time” in the “Add Automation” menu.

## Frequency scale

Several modules offer setting effect parameters as a function of frequency. This is one of the unique features that only additive synthesis allows. As an example you can set up LFO rates and depths for tremolo or vibrato so that each frequency has its own rate and depth setting.

Usually there are two choices:

- using **harmonics** (1 to the desired harmonics count). Subharmonics can be used which means a harmonic less than 1. For example 0.5 is an octave deeper than the fundamental (the note to be played). Use harmonics when you want “key-follow”.
- or using **absolute frequency** (zero to half the sampling rate)

## Using harmonics

The frequency scale is always linear and is zoomable and scrollable, and displays the harmonics.



- **Scroll:** Drag the blue selection rectangle to scroll, or use the mouse wheel.
- **Zoom:** Drag the edge of the blue selection rectangle to zoom, or use Ctrl+mouse wheel.
- **Reset Zoom:** Alt-click/Option+click, or double-click

## Using frequency

Right-click to switch scale between linear/log10/log2(Hz)/log2(A+octave)/log2(C+octave) scales. The scale is not zoomable for logarithmic scales.

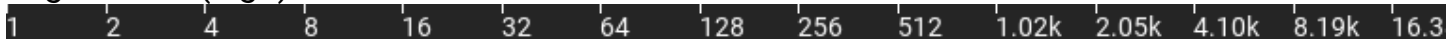
Linear:



Logarithmic (log10):



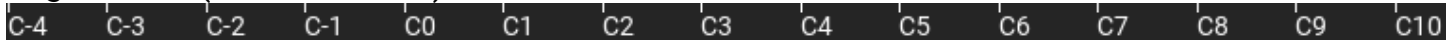
Logarithmic (log2):



Logarithmic (note A+octave):



Logarithmic (note C+octave):



## Timeline

The timeline is very useful for automation, and making evolving envelopes. Add any number of key-frames; between the key-frames the envelope is interpolated. Holding the mouse


button and moving the mouse horizontally will display the interpolated envelope.

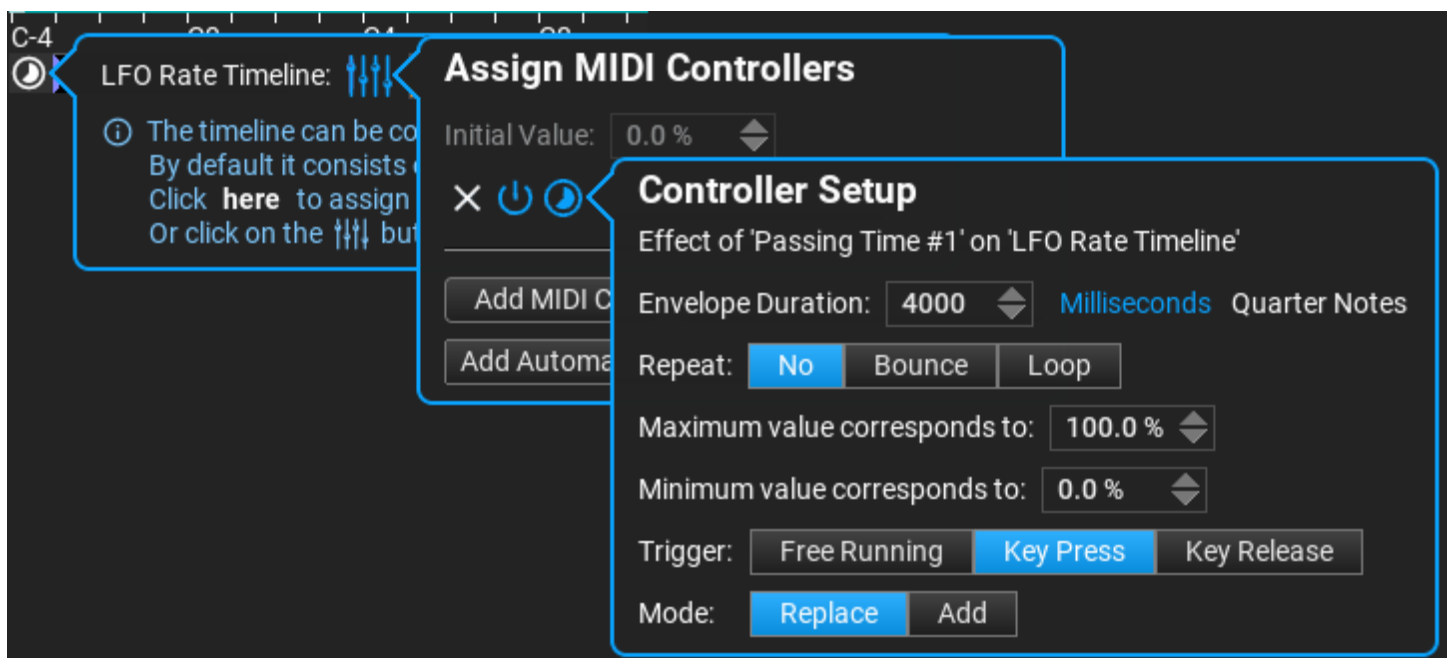


The active key-frame is displayed as green.

The timeline has 0% at the very left, and 100% at the rightmost position. You can use MIDI CC, automation or time to move between the key-frames during playback.

- **Add key-frame:** double-click or Ctrl-click on the timeline
- **Remove key-frame:** double-click or Ctrl-click on the key-frame
- **Move/rearrange key-frame:** drag key-frame horizontally
- **Select and edit key-frame envelope:** click on key-frame
- **Preview:** click and hold on the timeline

Click on  to set up the timeline. The timeline is represented by a standard parameter. Please see the “Parameter editing” chapter.



## Workspace

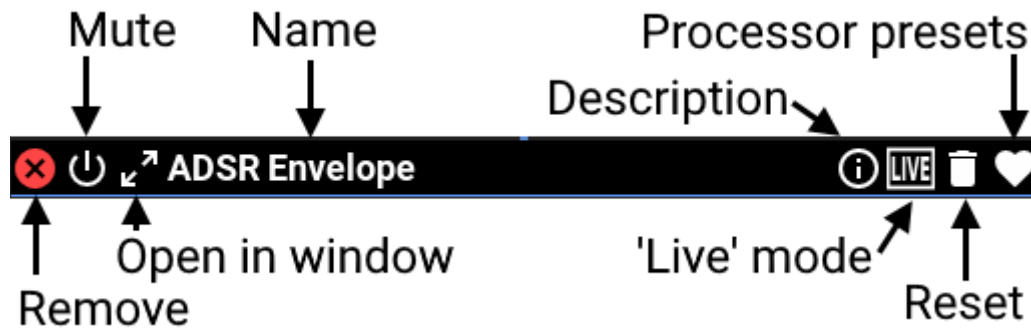
All preset editing takes place on the workspace. The workspace is zoomable (mouse wheel or magnifier icons at the right top corner) and movable by dragging the background. The default size and centered position is set for double-clicking on the background. Modules can be automatically centered and zoomed in by double-clicking in the title bar. You can read more



about inserting modules and making connections in the “**Building new sounds**” chapter.

## Modules


The title bar of each module includes standard buttons for removing, muting, saving/loading presets, getting information and for some components enabling ‘live’ view. A typical title bar looks like this:



By double-clicking on the title bar the module is centered on the workspace. Another double-click will restore the last layout.

## Working with presets

### Using existing presets

Click on  Presets to open the presets browser. Presets can be filtered by instrument type, attributes, author or a search string entered.

Local presets are stored in

C:\Users\\Documents\Syne\Presets\Local Presets (on Windows)

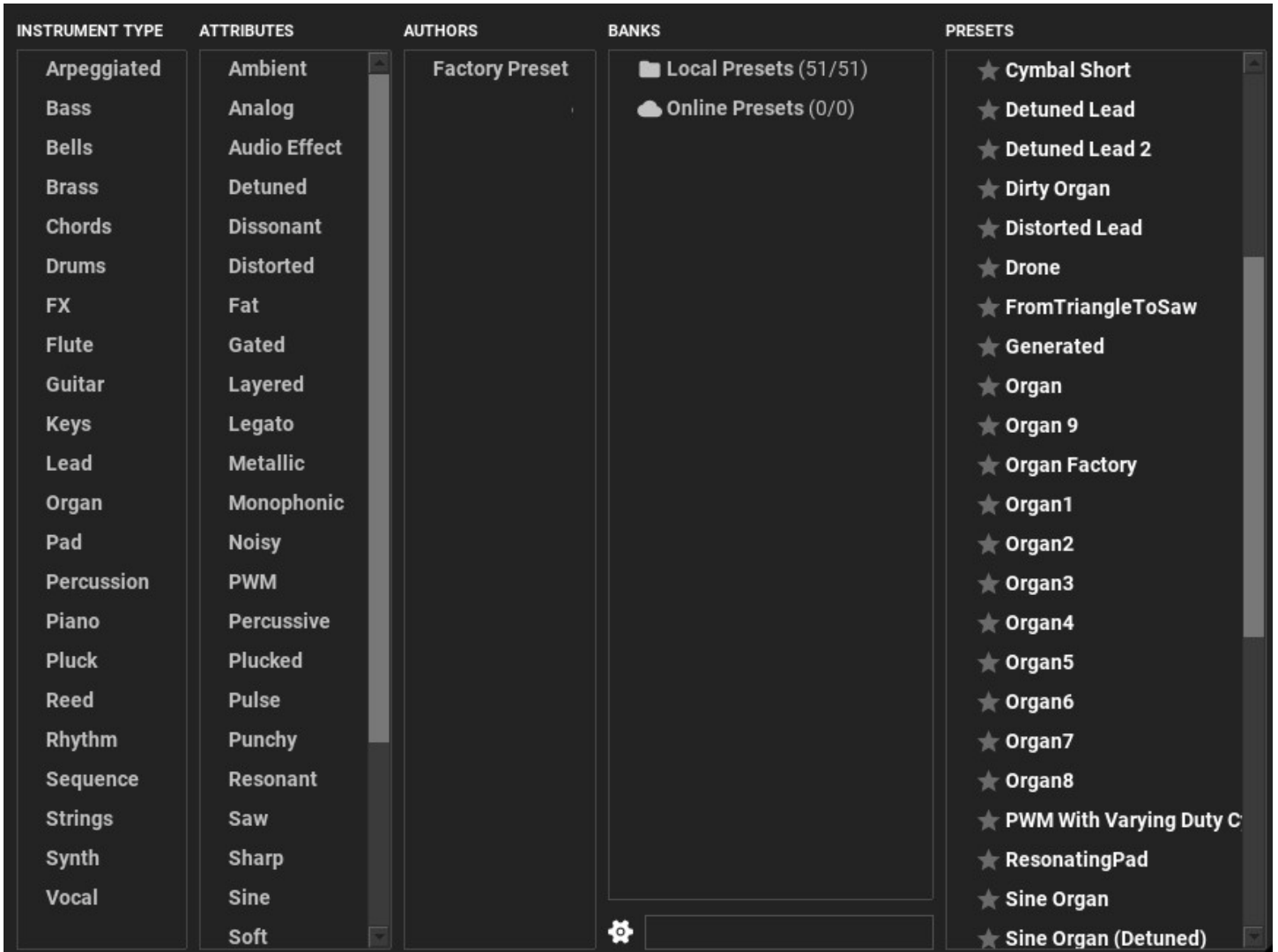
or

~/Documents/Syne/Presets/Local Presets (on macOS)

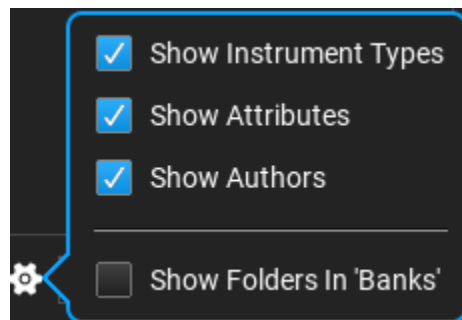
Preset banks should be copied into

C:\Users\\Documents\Syne\Presets (on Windows)

or  
~/Documents/Syne/Presets (on macOS)



The first 3 columns can be hidden:



Clicking on a preset will highlight the attributes, author and instrument type. Clicking on attributes will highlight all presets that has the selected attributes. Similarly clicking on an author will highlight presets made by that author, and clicking on an instrument type selects all presets of the clicked type.

Double clicking on a preset will load the preset.

View preset info by right-clicking on a preset. Here you can also delete the preset, which will remove the .syne file from your presets folder.

## Building new sounds

This is the fun part. Creating a new sound involves inserting and connecting partial sources and modules on the workspace. Hundreds or thousands of partials may travel on each connection. We made the UI very simple: instead of displaying a confusing UI with hundreds of knobs and lots of wiring like for an average modular synthesizer, you can see a few modules connected with top-to-bottom signal flow. Zooming in will show you more details. Double-clicking on the background resets the zoom, and positions the modules at the center of the workspace. Please study the “Modules” chapter for how to zoom in a module and how to open it in a separate window for editing.

### Inserting a module

Each preset requires at least one component that supplies partials for further processing. The following partial sources are included: **Waveforms**, **Partial Editor**, and **Noise**.

Whenever you can it is the easiest to use **Waveforms** rather than editing partials in **Partial Editor** which is for experienced users only. However **Partial Editor** lets you import wavetables or partials in CSV files. You can drop wavetables in uncompressed WAV or AIFF files on the workspace.

### Inserting a module

Click on a junction to insert a module, or click on a connection to insert a new module between two others. The menu of modules offers selecting a module preset directly.

## Tutorial: your first preset step by step

It takes a few seconds to make a new sound.

Let's make a simple supersaw sound. Before the first step you need to click on the preset name in the top bar, and click on “New Preset” in the menu to start from scratch.

**1.** right click on the background to insert a partial source. Select “**Waveforms**” from the menu. You can leave the default sawtooth wave, it will be perfect for our preset.

**2.** insert **ADSR Envelope** by clicking on the junction of **Waveforms**

**3.** insert **Detune** by clicking on the junction of **ADSR Envelope**.

Congratulations, you have just created your first sound! Now you can play a few notes, or use the small ► button to preview the new preset. Right click on ► to set up sound preview.

You can however tweak this preset by changing the source waveform, or adding a new module, so why not

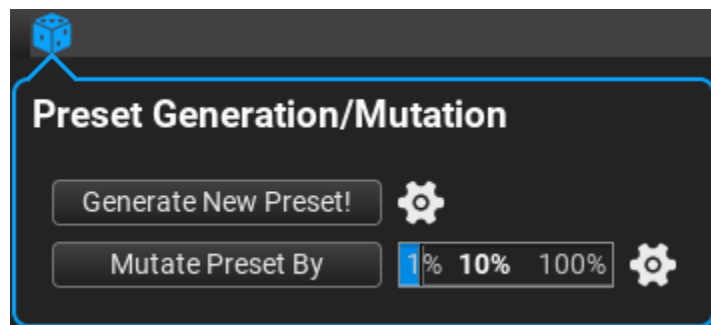
**4.** click on the junction of **Detune**: and add a **Filter**, but this time click on the small  and select “Sweep up 8dB”

*Note: an **ADSR Envelope** should always be present in the network. When missing, a “hidden” **ADSR Envelope** is used with fast attack and fast release to avoid clicking sounds.*

## Generating and mutating sounds

An interesting feature in **Syne** is that you can create presets randomly, and change an existing preset by a percentage value.

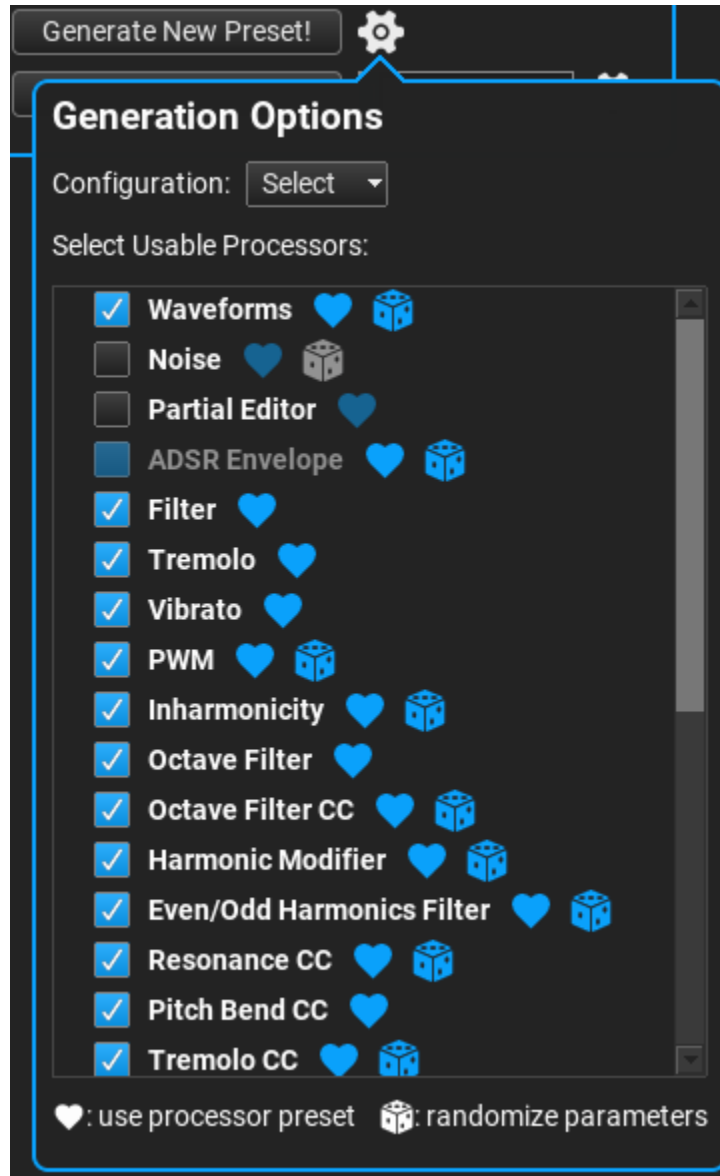
Click on the ‘dice’ button in the top status bar:





You have two options here: generate a new preset, or mutate an existing preset.

# Preset generation

1. First set the generation options. Click on :




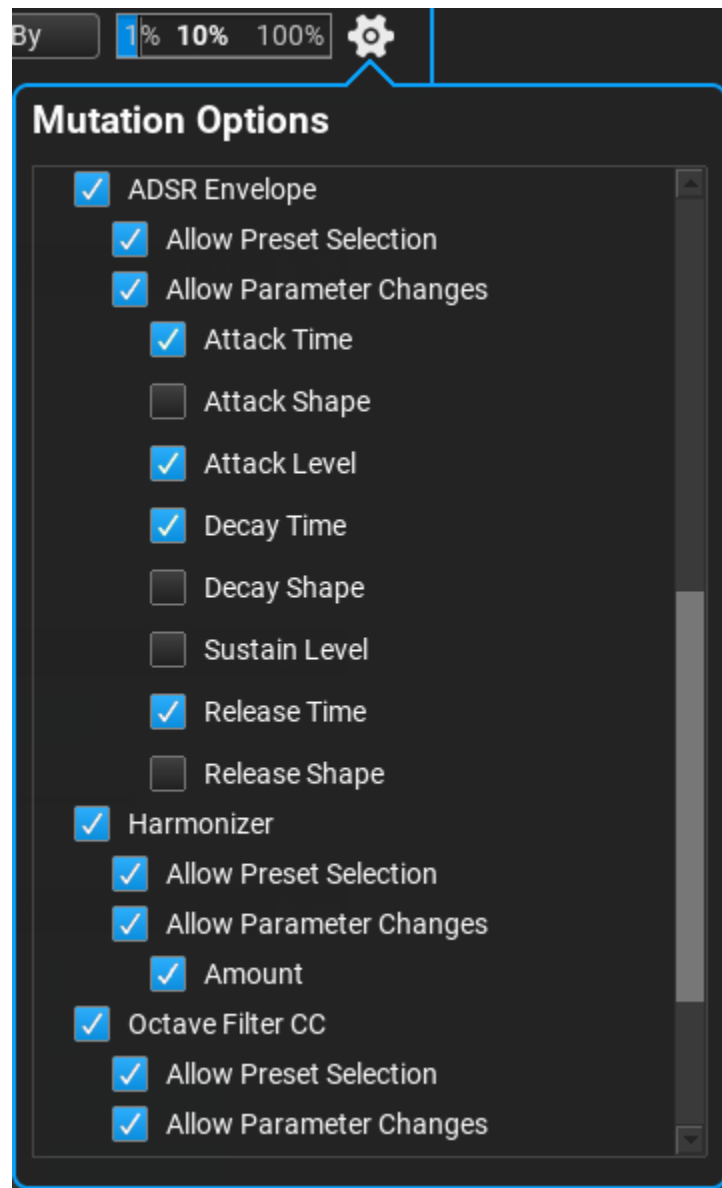
Set the configuration, which means the layout of modules. There are several possibilities from simple linear processing to multiple partial sources with or without an own ADSR.

Click on a checkbox next to the module names to allow using the module in the preset to be generated. Highlight the small buttons to enable using module presets () or randomizing parameters ()

2. Click on “**Generate New Preset**”. The create preset is displayed on the workspace. Please note that you can Ctrl-click on the ‘dice’ in the top bar to generate a new preset without opening the settings menu.

## Preset mutation

1. First set the mutation options. Click on  :



All the modules are listed in the current preset. You need to select which modules and which parameters you want to mutate, as well as if mutation may select a module preset.

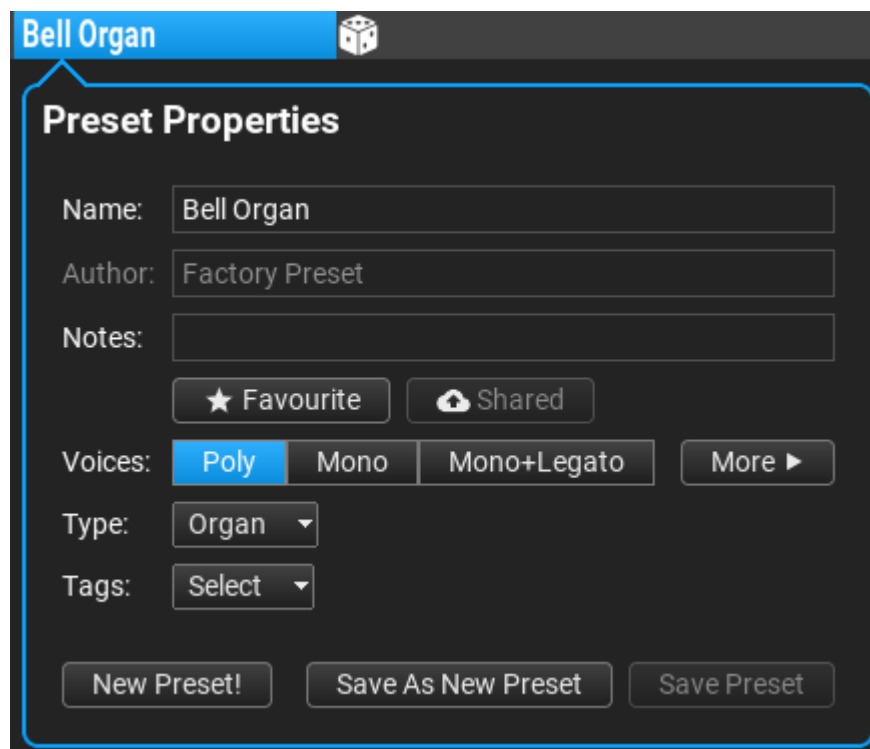
**Note:** *for an empty preset (no modules) this list is empty.*

**2.** Set the mutation amount with the slider from 1% to 100%

**3.** Click on “**Mutate Preset By**”

## Saving presets

To save a sound preset, click on the preset name in the top tool bar:



The image shows a dark-themed user interface for editing a preset. At the top, a blue bar contains the text 'Bell Organ' and a small cube icon. Below this is a white-bordered box titled 'Preset Properties'. Inside this box, there are several input fields and buttons: 'Name:' with a text box containing 'Bell Organ'; 'Author:' with a text box containing 'Factory Preset'; 'Notes:' with an empty text box; two buttons labeled '★ Favourite' and '🔗 Shared'; 'Voices:' with three buttons: 'Poly' (highlighted in blue), 'Mono', and 'Mono+Legato', plus a 'More ▶' button; 'Type:' with a dropdown menu showing 'Organ'; and 'Tags:' with a dropdown menu showing 'Select'. At the bottom of the 'Preset Properties' box are three buttons: 'New Preset!', 'Save As New Preset', and 'Save Preset'.

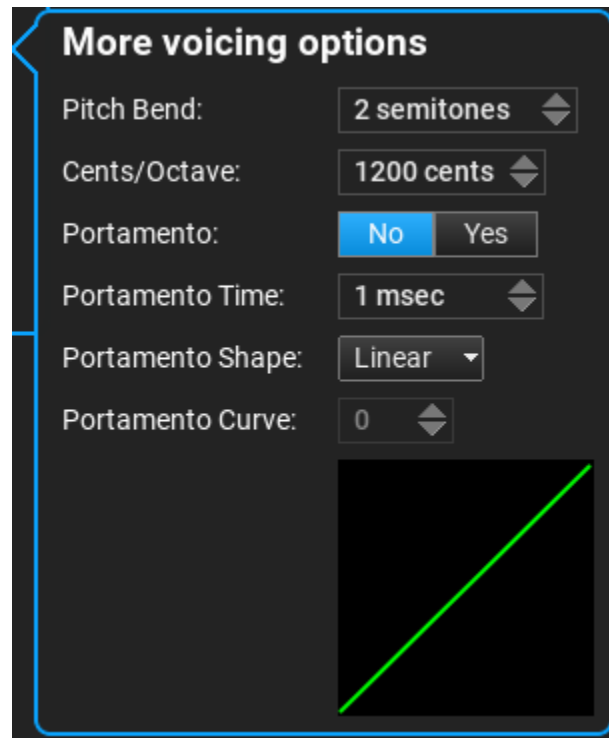
Fill the name, add optional notes, select if the sound is polyphonic or monophonic, select the instrument category (Organ, Piano, Pluck, Reed, Strings, etc) and assign a few attributes to the sound to find them more easily by attributes in the preset browser.

The user name from the settings is filled as the preset author.

**Note:** *overwriting a factory preset is not allowed because a software update will restore it, so*

you would lose the changes. Instead, press “Save As New Preset” to save a modified factory preset and provide a different name.

It is possible to set voicing options by clicking on the “More” button. For polyphonic sounds only **Pitch Bend** and **Cents/Octave** is displayed but for monophonic sounds portamento can be enabled:



Explanations for the various options:

- **Pitch Bend** (semitones): pitch bend range [*minimum: 0 semitones; maximum: 48 semitones; default: 2 semitones*]
- **Cents/Octave** (cents): number of cents between two keyboard notes of octave distance (e.g. C4 (MIDI note 60) and C5 (MIDI note 72)). An octave is normally 12 semitones=1200 cents, but it is possible to use a different setting, e.g. for sound effects and noises [*minimum: 0 semitones; maximum: 2400 cents; default: 1200 cents*]
- **Portamento**: enable/disable portamento (pitch sliding from one note to the other)
- **Portamento Time** (milliseconds): portamento duration [*minimum: 1 milliseconds; maximum: 2000 milliseconds; default: 100 milliseconds*]
- **Portamento Shape**: the portamento curve type [*Linear, Exponential, Exponential Connected*]
- **Portamento Curve**: the portamento curve curvature [*minimum: 0; maximum: 100; default: 50*]



# Module reference

All modules allow one input and one output connection. The only exceptions are the 'Adder' and 'Splitter', described below.

## Adder



The 'Adder' is the only module which handles multiple input connections. It sums the partials that arrive on its input and passes them to its output.

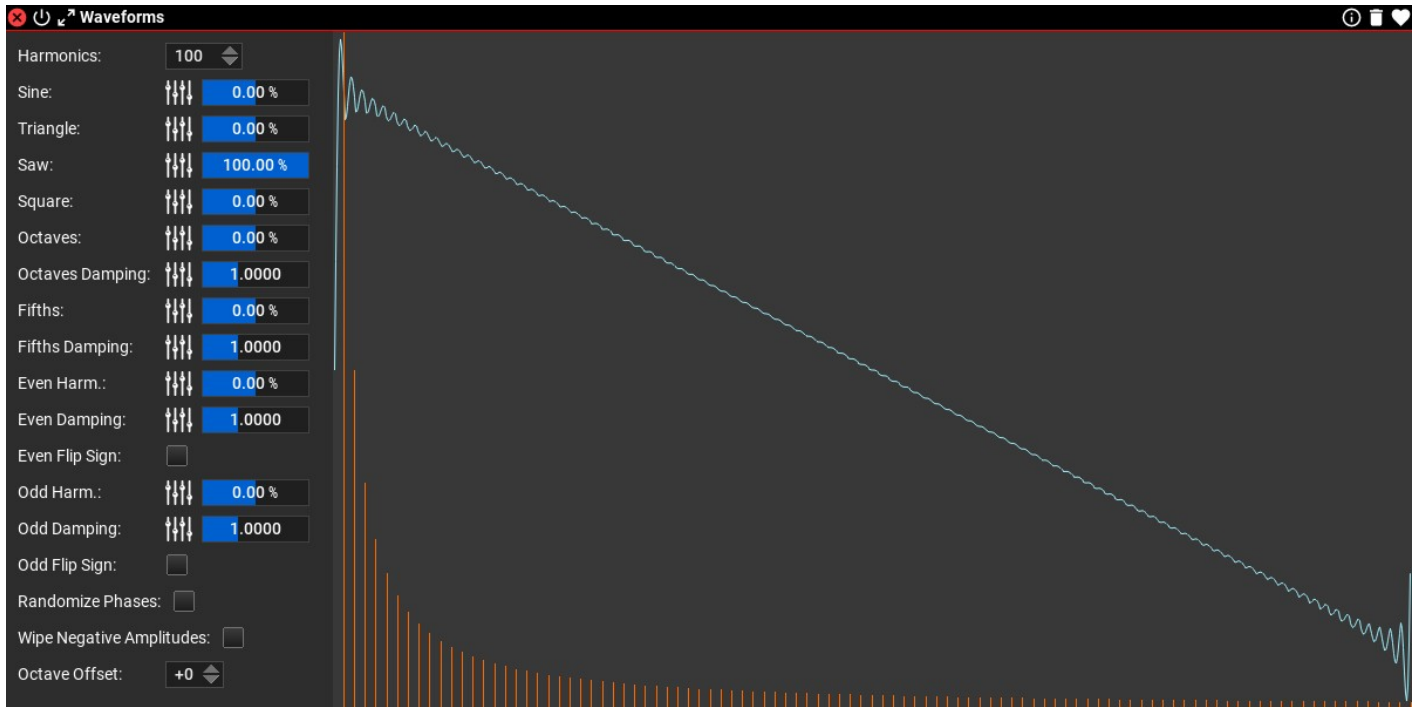
## Splitter



The 'Splitter' sends partials from its input connection to multiple outputs.

# Partial sources

## Waveforms



'Waveforms' hides the complicated aspects of the inner workings of additive synthesis. You don't have to edit partials if you don't want to. Use standard waveforms as the source for harmonics. Mix the waveforms or use MIDI CC's or automation to control them. It is possible to generate a random waveform.

## Waveforms Settings

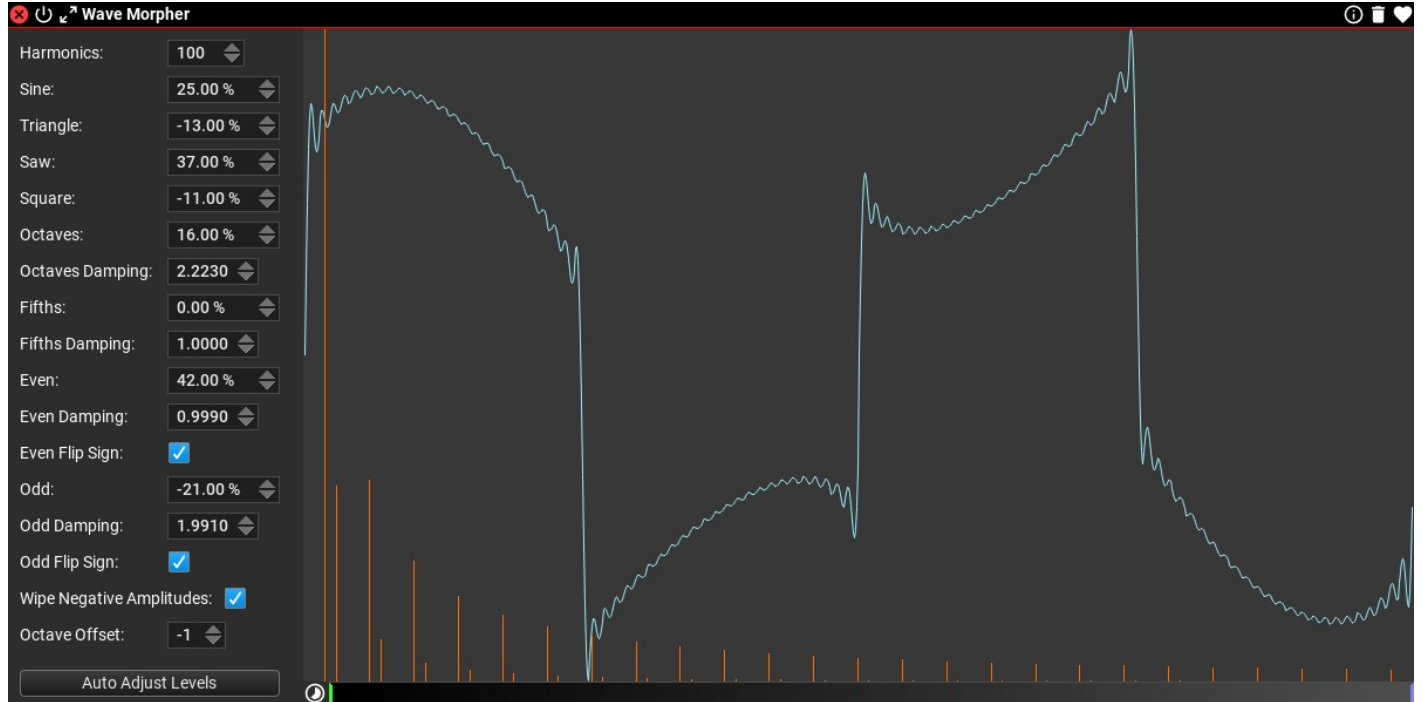
- **Harmonics:** number of harmonics to use. Typically 100-200 are good choices. [*minimum: 1; maximum: 1000; default: 100*]
- **Sine (%)**: Amplitude of sine wave [*minimum: -100.00 %; maximum: 100.00 %; default: 0.00 %*]
- **Triangle (%)**: Amplitude of triangle wave [*minimum: -100.00 %; maximum: 100.00 %; default: 0.00 %*]
- **Saw (%)**: Amplitude of sawtooth wave [*minimum: -100.00 %; maximum: 100.00 %; default: 100.00 %*]
- **Square (%)**: Amplitude of square wave [*minimum: -100.00 %; maximum: 100.00 %; default: 0.00 %*]

- **Octaves (%)**: Amplitude of octaves harmonics (1, 2, 4, 8, etc) [*minimum: -100.00 %; maximum: 100.00 %; default: 0.00 %*]
- **Octave Damping**: Partial amplitudes exponential damping;
  - 0: all partials have the same amplitude;
  - 1:  $1/N$  damping in amplitudes;
  - 2:  $1/N^2$  damping in amplitudes;
  - 3:  $1/N^3$  damping in amplitudes [*minimum: 0.000 ; maximum: 3.000 ; default: 1.000*]
- **Fifths (%)**: Amplitude of fifths harmonics (3, 6, 12, 24, etc) [*minimum: -100.00 %; maximum: 100.00 %; default: 0.00 %*]
- **Fifths Damping**: Partial amplitudes exponential damping;
  - 0: all partials have the same amplitude;
  - 1:  $1/N$  damping in amplitudes;
  - 2:  $1/N^2$  damping in amplitudes;
  - 3:  $1/N^3$  damping in amplitudes [*minimum: 0.000 ; maximum: 3.000 ; default: 1.000*]
- **Even Harm. (%)**: Amplitude of even harmonics [*minimum: -100.00 %; maximum: 100.00 %; default: 0.00 %*]
- **Even Damping**: Partial amplitudes exponential damping;
  - 0: all partials have the same amplitude;
  - 1:  $1/N$  damping in amplitudes;
  - 2:  $1/N^2$  damping in amplitudes;
  - 3:  $1/N^3$  damping in amplitudes [*minimum: 0.000 ; maximum: 3.000 ; default: 1.000*]
- **Even Flip Sign**: invert every 2<sup>nd</sup> even harmonic
- **Odd Harm. (%)**: Amplitude of odd harmonics [*minimum: -100.00 %; maximum: 100.00 %; default: 0.00 %*]
- **Odd Damping**: Partial amplitudes exponential damping;
  - 0: all partials have the same amplitude;
  - 1:  $1/N$  damping in amplitudes;
  - 2:  $1/N^2$  damping in amplitudes;
  - 3:  $1/N^3$  damping in amplitudes [*minimum: 0.000 ; maximum: 3.000 ; default: 1.000*]
- **Odd Flip Sign**: invert every 2<sup>nd</sup> odd harmonic
- **Randomize Phases**: when using lots of even or odd harmonics, it is best to make the initial phases random. The waveform changes radically because when all phases are zero, lots of sinusoidal harmonics wipe out each other.
- **Wipe Negative Amplitudes**: negative amplitudes will be ignored

**Auto Adjust Levels**: the parameters are adjusted to avoid clipping.

**Generate Random Waveform**: the parameters are set randomly to get a new periodic waveform.

# Wave Morpher



'Wave Morpher' is the same as 'Waveforms' with a timeline, but without the possibility to automate the amplitude of each waveform. It is possible to generate a random waveform for every keyframe for a single click on "Generate Random Waveform".

## Wave Morpher Settings

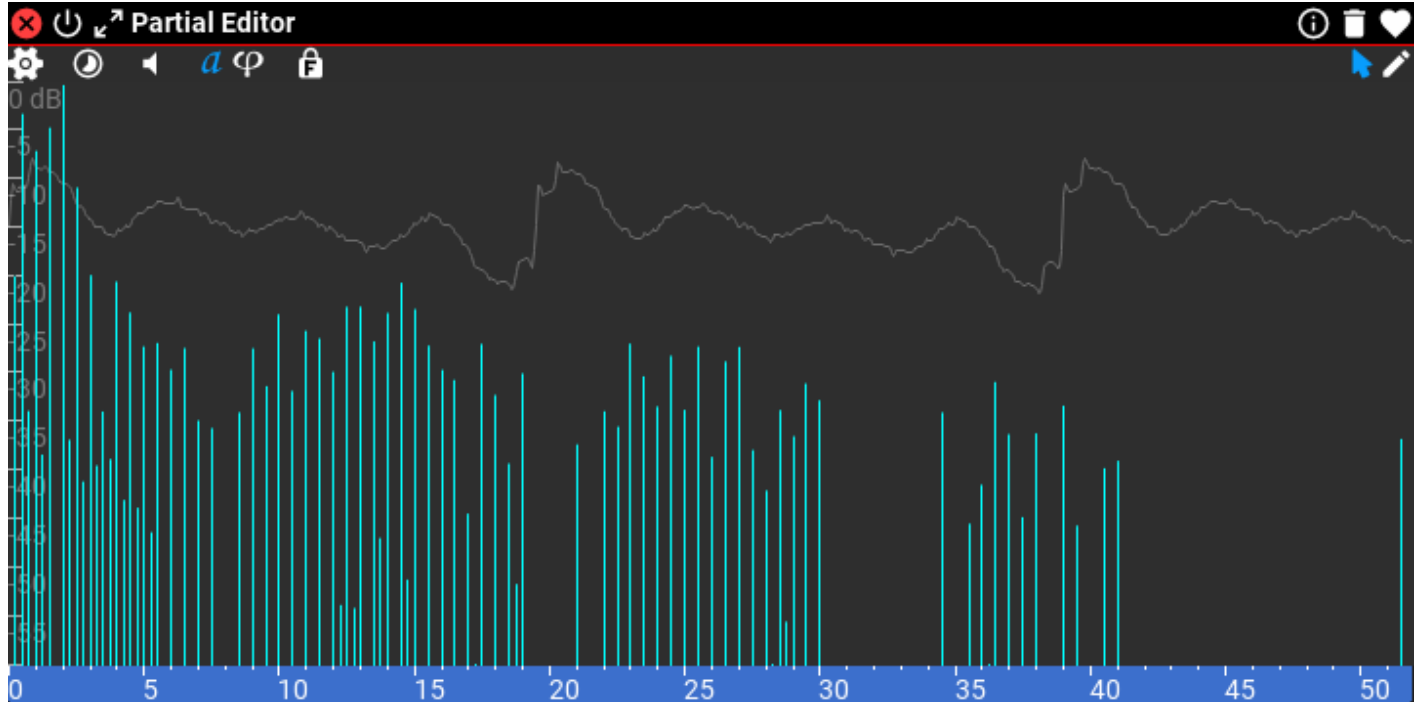
- **Harmonics:** number of harmonics to use. Typically 100-200 are good choices. [*minimum: 1; maximum: 1000; default: 100*]
- **Sine (%)**: Amplitude of sine wave [*minimum: -100.00 %; maximum: 100.00 %; default: 0.00 %*]
- **Triangle (%)**: Amplitude of triangle wave [*minimum: -100.00 %; maximum: 100.00 %; default: 0.00 %*]
- **Saw (%)**: Amplitude of sawtooth wave [*minimum: -100.00 %; maximum: 100.00 %; default: 100.00 %*]
- **Square (%)**: Amplitude of square wave [*minimum: -100.00 %; maximum: 100.00 %; default: 0.00 %*]
- **Octaves (%)**: Amplitude of octaves harmonics (1, 2, 4, 8, etc) [*minimum: -100.00 %; maximum: 100.00 %; default: 0.00 %*]
- **Octave Damping:** Partial amplitudes exponential damping;
  - 0: all partials have the same amplitude;
  - 1: 1/N damping in amplitudes;
  - 2: 1/N<sup>2</sup> damping in amplitudes;

- 3:  $1/N^3$  damping in amplitudes [*minimum: 0.000 ; maximum: 3.000 ; default: 1.000*]
- **Fifths (%)**: Amplitude of fifths harmonics (3, 6, 12, 24, etc) [*minimum: -100.00 %; maximum: 100.00 %; default: 0.00 %*]
- **Fifths Damping**: Partial amplitudes exponential damping;
  - 0: all partials have the same amplitude;
  - 1:  $1/N$  damping in amplitudes;
  - 2:  $1/N^2$  damping in amplitudes;
  - 3:  $1/N^3$  damping in amplitudes [*minimum: 0.000 ; maximum: 3.000 ; default: 1.000*]
- **Even Harm. (%)**: Amplitude of even harmonics [*minimum: -100.00 %; maximum: 100.00 %; default: 0.00 %*]
- **Even Damping**: Partial amplitudes exponential damping;
  - 0: all partials have the same amplitude;
  - 1:  $1/N$  damping in amplitudes;
  - 2:  $1/N^2$  damping in amplitudes;
  - 3:  $1/N^3$  damping in amplitudes [*minimum: 0.000 ; maximum: 3.000 ; default: 1.000*]
- **Even Flip Sign**: invert every 2<sup>nd</sup> even harmonic
- **Odd Harm. (%)**: Amplitude of odd harmonics [*minimum: -100.00 %; maximum: 100.00 %; default: 0.00 %*]
- **Odd Damping**: Partial amplitudes exponential damping;
  - 0: all partials have the same amplitude;
  - 1:  $1/N$  damping in amplitudes;
  - 2:  $1/N^2$  damping in amplitudes;
  - 3:  $1/N^3$  damping in amplitudes [*minimum: 0.000 ; maximum: 3.000 ; default: 1.000*]
- **Odd Flip Sign**: invert every 2<sup>nd</sup> odd harmonic
- **Wipe Negative Amplitudes**: negative amplitudes will be ignored

**Auto Adjust Levels**: the parameters are adjusted to avoid clipping.

**Generate Random Waveform**: the parameters are set randomly to get a new periodic waveform. A new waveform is created for all key-frames.

# Partial Editor



This is a full-fledged partial editor. You rarely need to edit partials as you can use the simpler **Waveforms** as a signal source. On the other hand you can import a wavetable (whole or single frame) or import partials from CSV files, or just use standard waveforms. You can drop a wavetable file directly on the editor or on the workspace.


It is possible to set up a timeline for The Partial Editor. The partials are interpolated between keyframes.


## Partial Editor Tool Bar


 : set up waveform, or import partials from CSV or import a wavetable.


 : enable/disable timeline.

 : immediate preview during editing

 : edit partial amplitudes

 : edit partial phases. Please note you don't "hear" the phases so the sound won't change.

 : lock partial frequencies during editing. Highlight this to avoid accidental changes to partial frequencies

 : Select and edit partials. Perform operations on individual or selected partials.

**Create/delete partials:** Ctrl-click or double-click

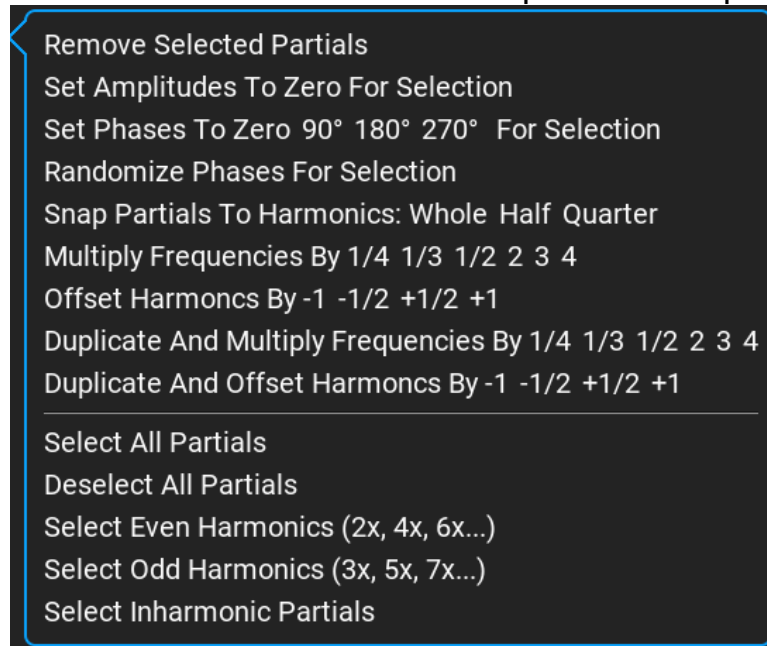
**Edit partial data:** Alt-click on partial


**Snap to harmonics:** hold Shift during dragging partials

**Linear frequency change:** hold Alt before dragging partials

**Context menu:** right clicking

The context menu offers lots of operations on partials:



 : Shape partials: draw curves or lines with the mouse to set partial amplitudes/phases.

**Draw line:** Shift-drag

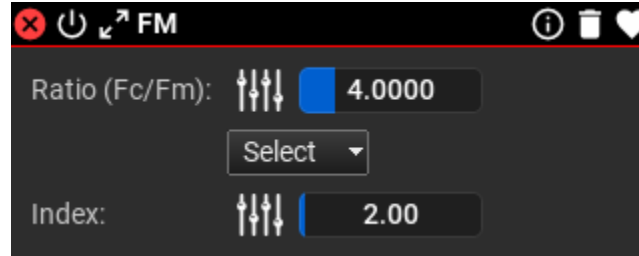
**Change selected partials only:** hold Alt

**Context menu:** right clicking (same menu as above)

## Partial Editor Settings

- **Partial Editor Timeline (%)**: timeline for partials [*minimum: 0.0 %; maximum: 100.0 %; default: 0.0 %*]

# FM

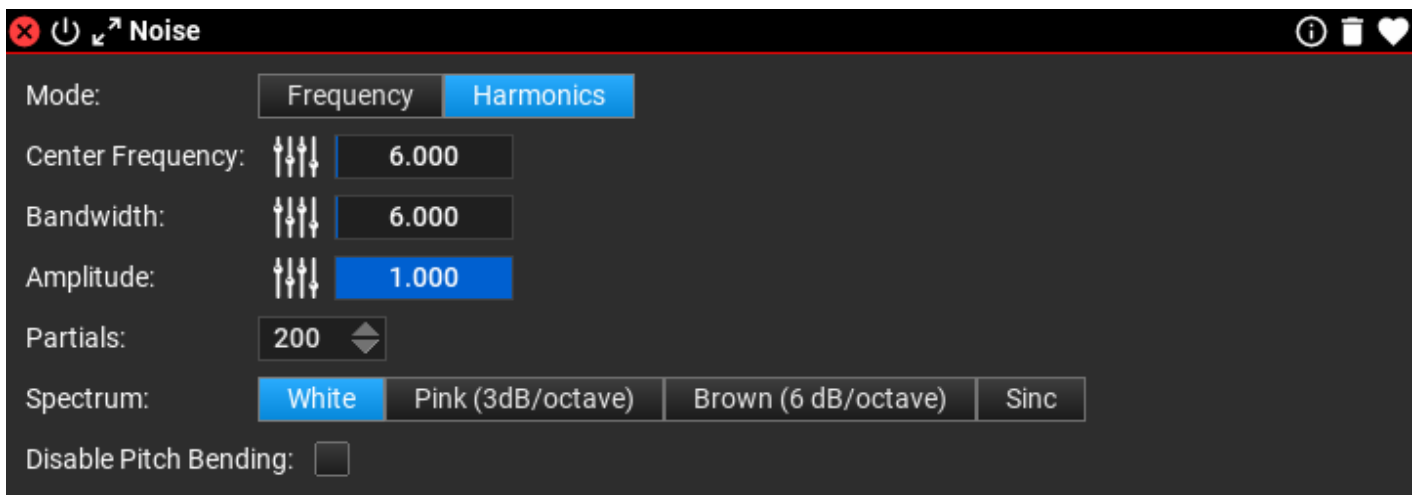


Frequency modulation (FM) is a form of sound synthesis whereby the frequency of a waveform is changed by modulating its frequency with a modulator. The frequency of an oscillator is altered in accordance with the amplitude of a modulating signal. FM synthesis can create both harmonic and inharmonic sounds. To synthesize harmonic sounds, the modulating signal must have a harmonic relationship to the original carrier signal. As the amount of frequency modulation increases, the sound grows progressively complex. Through the use of modulators with frequencies that are non-integer multiples of the carrier signal, inharmonic bell-like and percussive spectra can be created.

## FM Settings

- **Ratio (Fc/Fm):** The ratio of carrier and modulating frequency. Select integer or simple fractional ratios from the menu below. [*minimum: 0.1 ; maximum: 20.0 ; default: 4.0*]
- **Index:** Modulation index [*minimum: 0.1 ; maximum: 50.0 ; default: 2.0*]

# Noise





Generate white or pink band-limited noise around the center frequency. For band-limited noise generation many partials are placed inside the frequency range, with a random offset to reduce the 'machine gun' effect.

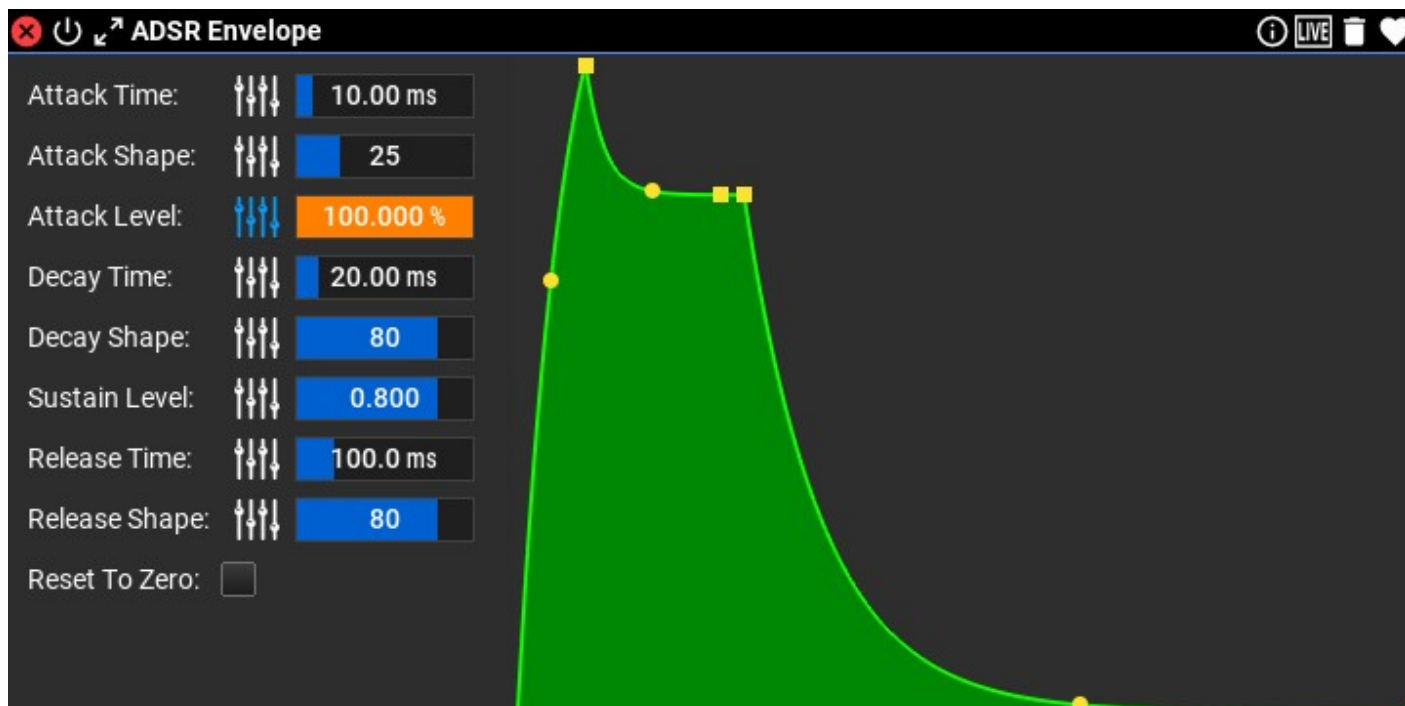
## Noise Settings

- **Mode:** Select working with absolute frequencies, or harmonics. Center Frequency and Bandwidth is expressed in Hertz or harmonic, depending on this setting.
- **Center Frequency:** Noise center frequency [*minimum: 0.000 ; maximum: 24000.0/200.0 ; default: 6.000*]
- **Bandwidth:** Noise bandwidth [*minimum: 1.000 ; maximum: 24000.0/200.0; default: 6.000*]
- **Amplitude:** Noise amplitude [*minimum: 0.000 ; maximum: 1.000 ; default: 1.000*]
- **Partials:** the number of partials to be used to create the noise. The more partials the more natural the noise will be
- **Spectrum:** the shape of the noise segment [*White (rectangular), Pink (3 dB/octave), Brown (6 dB/octave), Sinc*]
- **Disable Pitch Bending:** pitch bending will not affect the noise when this is checked

# Basic modules

These are the most useful modules, typically with frequency/harmonic curve editors which let you set up a parameter as a function of frequency. Some modules include a timeline for automation.

## ADSR Envelope



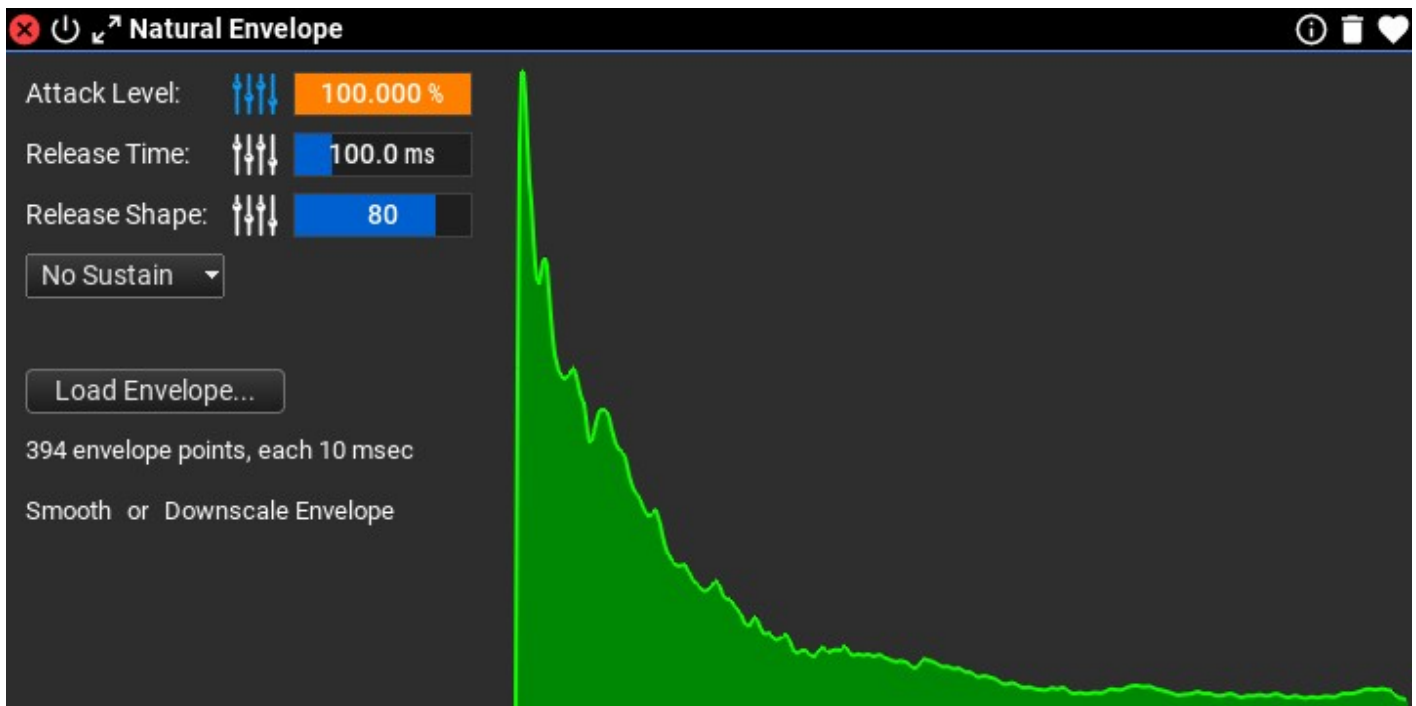
This is a traditional parametric envelope that defines the attack, decay, sustain and release of the sound. You can assign a MIDI CC to any parameters which modifies or replaces the time, shape or level of the envelope.

## ADSR Envelope Settings

- **Attack Time** (ms): Envelope attack time in milliseconds [*minimum: 0.0 ms; maximum: 10000.0 ms; default: 10.0 ms*]
- **Attack Shape**: Envelope attack shape [*minimum: 0; maximum: 100; default: 25*]
- **Decay Time** (ms): Envelope decay time [*minimum: 0.0 ms; maximum: 10000.0 ms; default: 20.0 ms*]
- **Decay Shape**: Envelope decay shape [*minimum: 0; maximum: 100; default: 80*]
- **Sustain Level**: Envelope sustain level [*minimum: 0.000; maximum: 1.000; default: 0.800*]

- **Release Time** (ms): Envelope release time [*minimum: 0.0 ms; maximum: 10000.0 ms; default: 100.0 ms*]
- **Release Shape**: Envelope release shape [*minimum: 0; maximum: 100; default: 80*]
- **Attack Level** (%): Envelope attack level Usually this should depend on Note On velocity [*minimum: 0.000 %; maximum: 100.000 %; default: 100.000 %*]
- **Hold Time** (ms): Envelope hold time, after attack [*minimum: 0.0 ms; maximum: 10000.0 ms; default: 0.0 ms*]
- **Reset To Zero**: Each attack will start from zero amplitude rather than from the last envelope amplitude. It is best to uncheck this setting, otherwise clicks may occur at the beginning of notes.

## Natural Envelope



Use an envelope sampled from real physical instruments.

## Natural Envelope Settings

- **Attack Level** (%): Envelope attack level This should usually depend on Note On velocity [*minimum: 0.000 %; maximum: 100.000 %; default: 100.000 %*]
- **Release Time** (ms): Envelope release time [*minimum: 0.0 ms; maximum: 10000.0 ms; default: 100.0 ms*]
- **Release Shape**: Envelope release shape [*minimum: 0; maximum: 100; default: 80*]

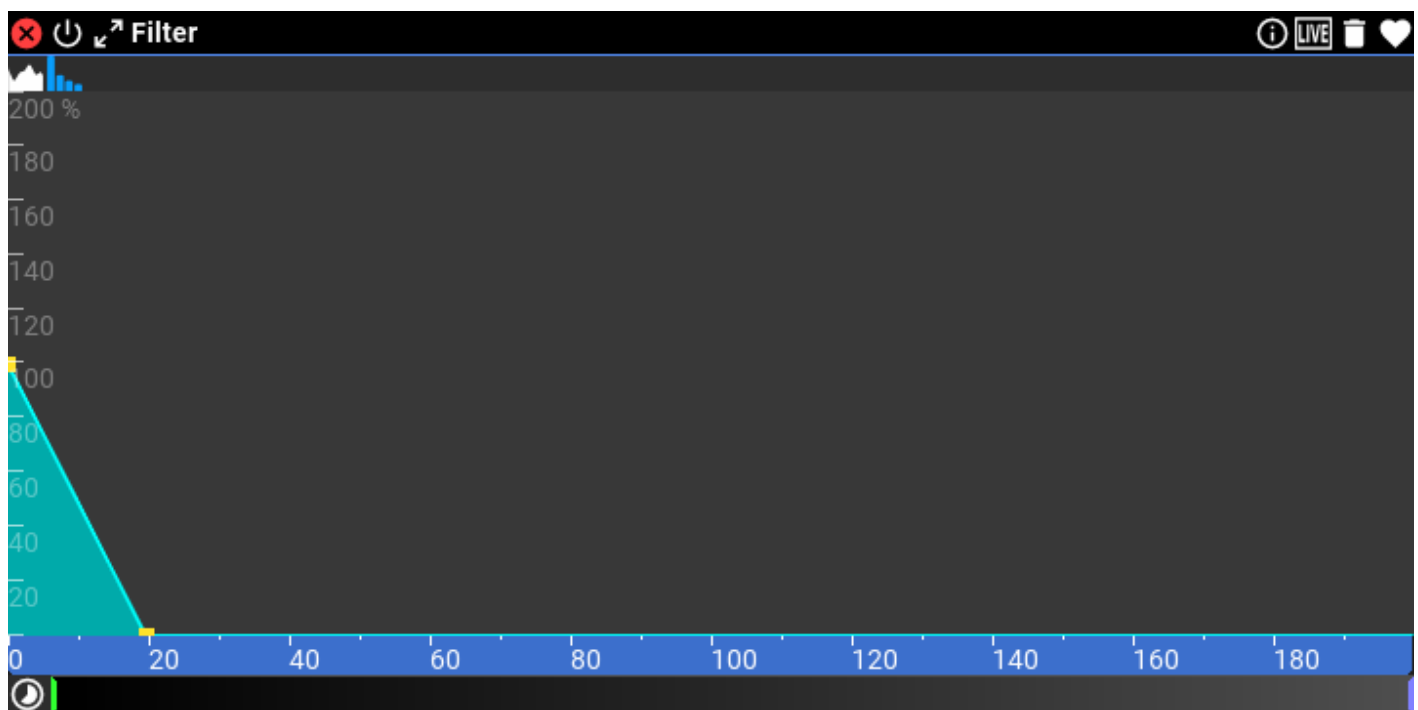
- **Sustain option:** specify how sustain is handled [*No Sustain, Sustain And Continue With Envelope, Sustain And Continue With Release*]

**Load Envelope:** load an envelope from uncompressed PCM WAV or AIFF file

**Smooth Envelope:** smooth the jagged edges of the envelope


**Downscale Envelope:** if the envelope contains too many points (i.e. very long) clicking on "Downscale" will reduce the number of envelope points


## Filter



This is a flexible filter that is controlled by time or MIDI CC's. You can build any type of filters without limitations: high-pass, low-pass, band-pass, band-reject or any combinations of these, with or without resonance... The filter works on either partials, or absolute frequency. Setting curve points less than 100% will attenuate the partials, while values over 100% will accentuate them. Filter has a timeline which makes it the **most useful module in Syne**.

### Filter Tool Bar

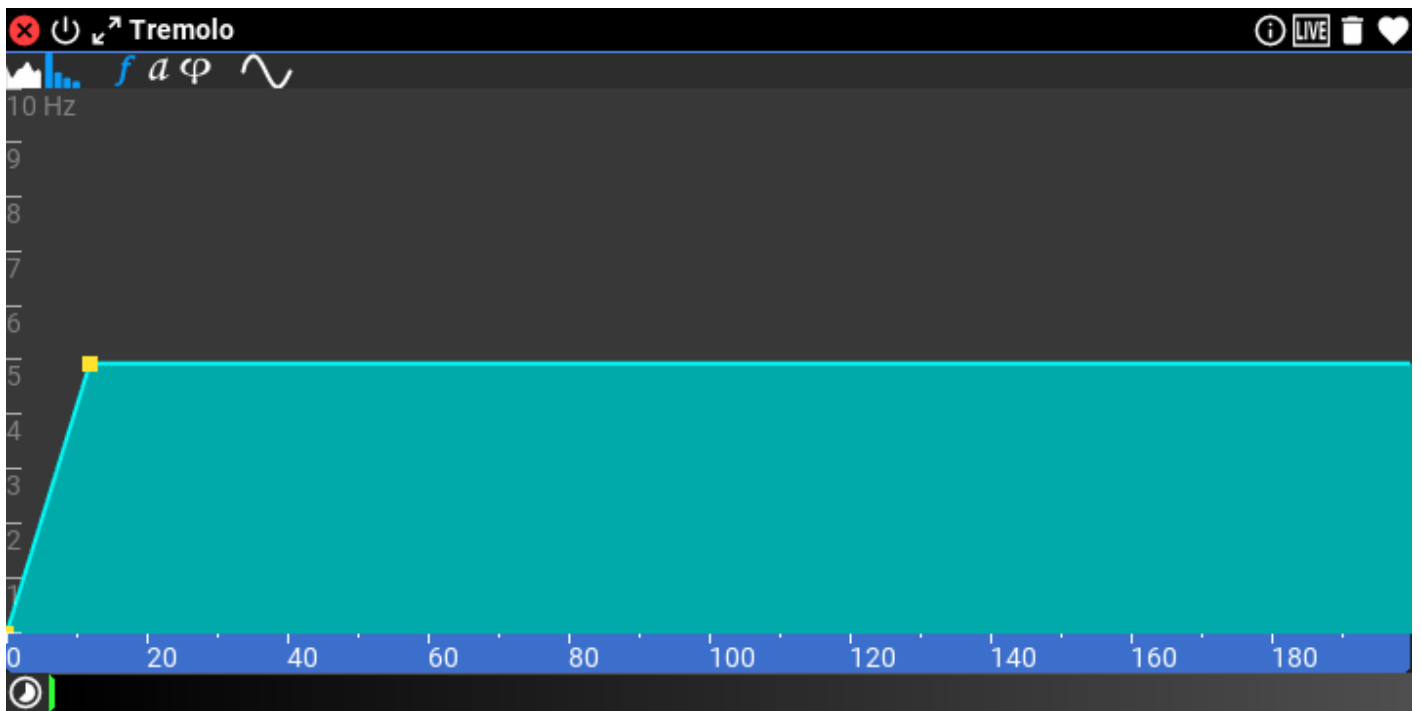
: operate on absolute frequencies. The scale displays frequency from zero to half the sampling rate in Hertz.

 : operate on partials. The scale displays harmonics. Right click on the scale to set the number of harmonics to display

## Filter Settings


- **Filter Timeline (%)**: Filter timeline [*minimum: 0.0 %; maximum: 100.0 %; default: 0.0 %*]


## Tremolo





The tremolo effect applies oscillation on the partial amplitudes. LFO depth and rate is set up as a function of *absolute* or *partial* frequency and can change in time or by one or more MIDI CC's.


## Tremolo Tool Bar

 : operate on absolute frequencies. The scale displays frequency from zero to half the sampling rate in Hertz.

 : operate on partials. The scale displays harmonics. Right click on the scale to set the number of harmonics to display

 : edit LFO rate (frequency) as a function of partial frequency

 : edit LFO depth (amplitude) as a function of partial frequency

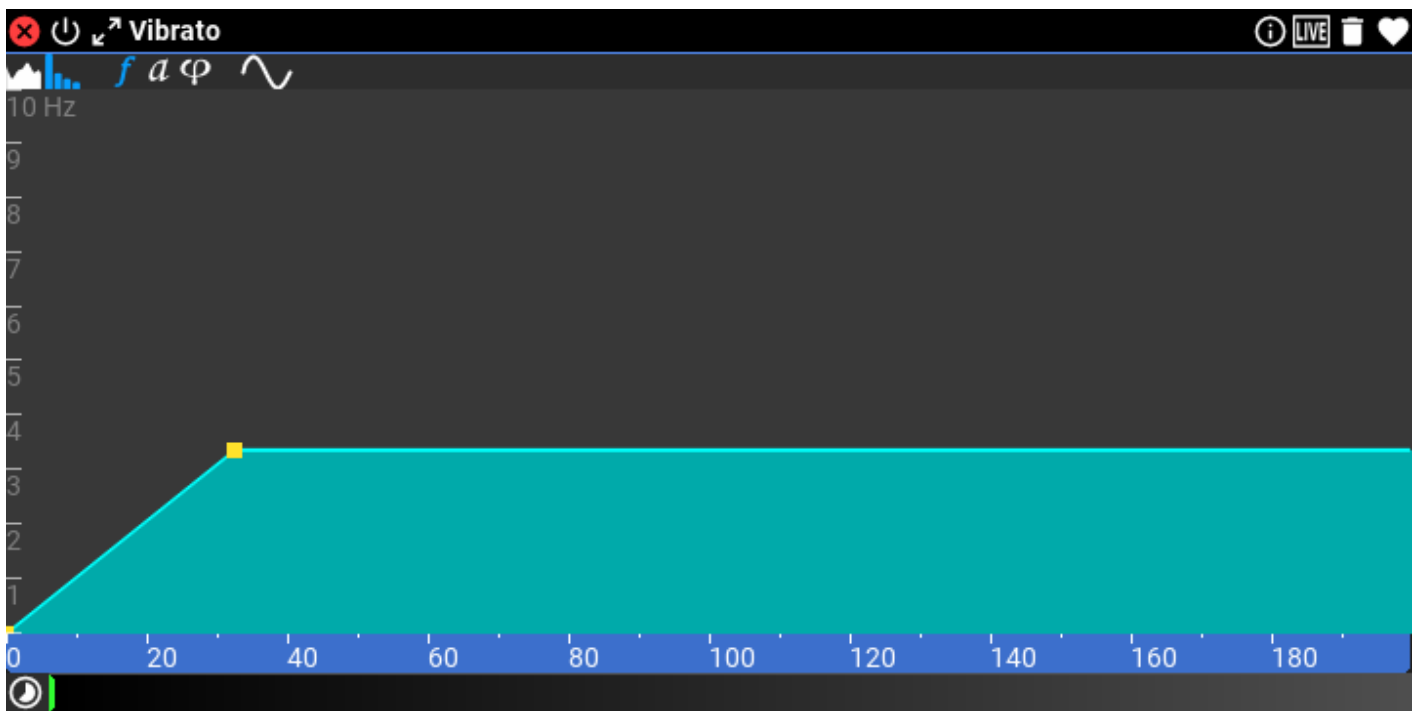
 : edit LFO initial phase as a function of partial frequency

 : select LFO waveform

## Tremolo Settings


- **LFO Depth Timeline (%)**: LFO Depth timeline [*minimum: 0.0 %; maximum: 100.0 %; default: 0.0 %*]
- **LFO Rate Timeline (%)**: LFO Rate timeline [*minimum: 0.0 %; maximum: 100.0 %; default: 0.0 %*]


## Vibrato





The vibrato effect applies oscillation on the partial frequencies. LFO depth and rate is set up as a function of *absolute* or *partial* frequency and can change in time or by one or more MIDI CC's.


## Vibrato Tool Bar

 : operate on absolute frequencies. The scale displays frequency from zero to half the sampling rate in Hertz.

 : operate on partials. The scale displays harmonics. Right click on the scale to set the number of harmonics to display

 : edit LFO rate (frequency) as a function of partial frequency

 : edit LFO depth (amplitude) as a function of partial frequency

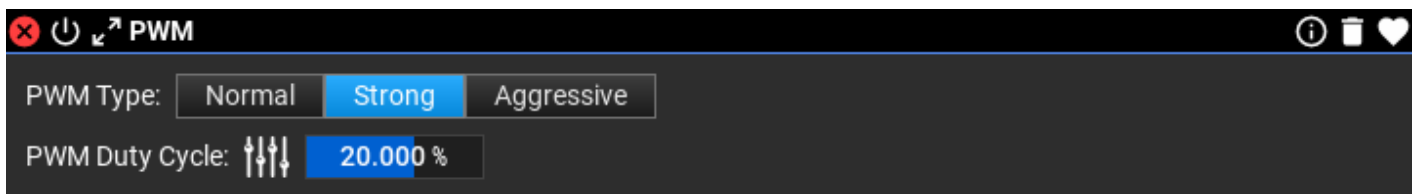
 : edit LFO initial phase as a function of partial frequency

 : select LFO waveform

## Vibrato Settings

- **LFO Depth Timeline (%)**: LFO Depth timeline [*minimum: 0.0 %; maximum: 100.0 %; default: 0.0 %*]
- **LFO Rate Timeline (%)**: LFO Rate timeline [*minimum: 0.0 %; maximum: 100.0 %; default: 0.0 %*]

## PWM



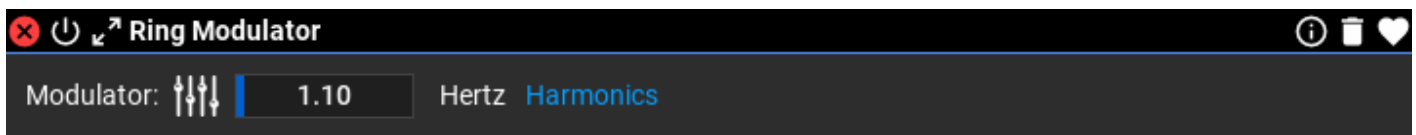
Pulse width modulation reproduced with additive synthesis. As opposed to PCM PWM, any

signals can be used as input, and it offers a “Strong” and an “Aggressive” setting besides the “Normal” PWM simulation.

## PWM Settings

- **PWM Type:** different types affect higher harmonics differently [*Normal, Strong, Aggressive*]
- **PWM Duty Cycle (%)**: PWM duty cycle from 1% to 50% [*minimum: 1.000 %; maximum: 50.000 %; default: 20.000 %*]

## Ring Modulator



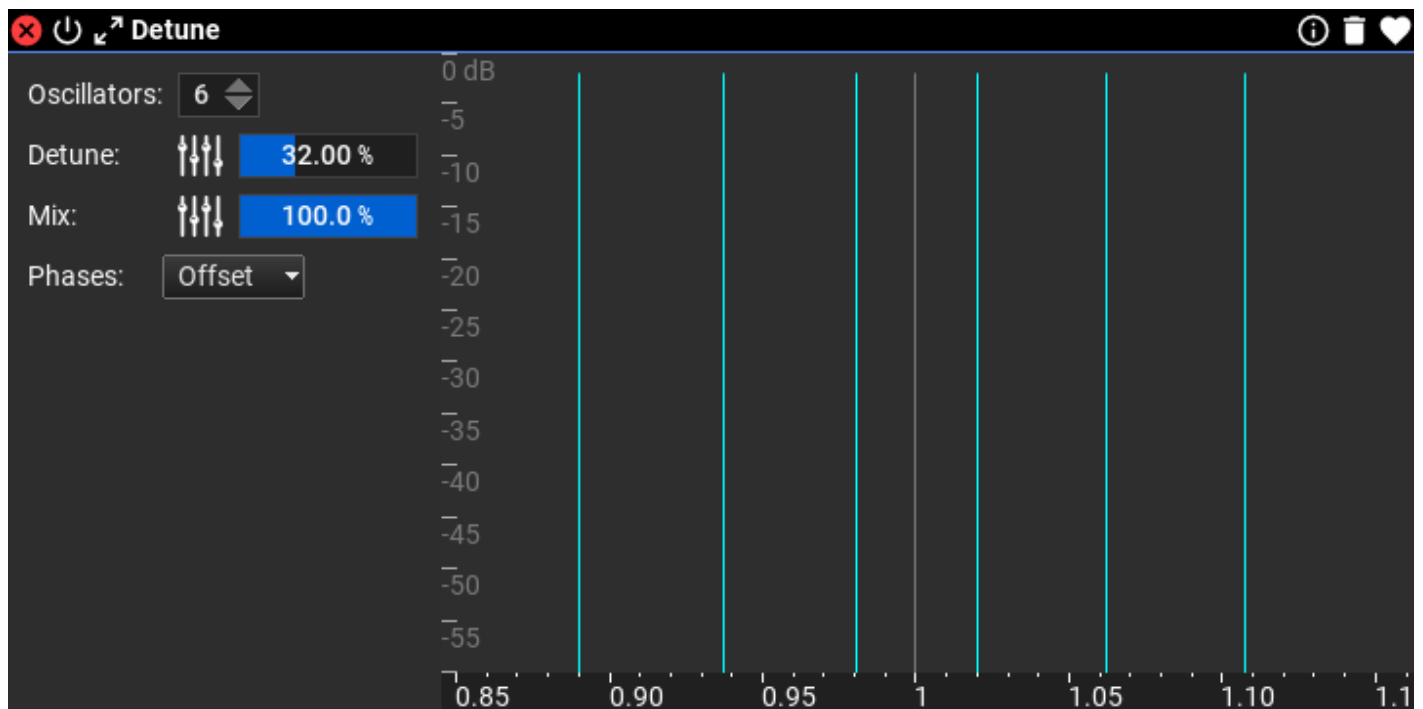
Ring modulation is the multiplication of two bipolar audio signals by each other. In additive synthesis additional partials appear as the sum and difference of the carrier and modulator frequencies. The original partials are not present in the resulting signal. The modulator is a simple sine wave with frequency control. For 'key follow' you need to specify the modulator in harmonics.

## Ring Modulator Settings

- **Modulator:** Modulator Frequency (either in Hertz or in harmonics) [*minimum: 0.00 ; maximum: 20.00 ; default: 1.10*]

## Detune



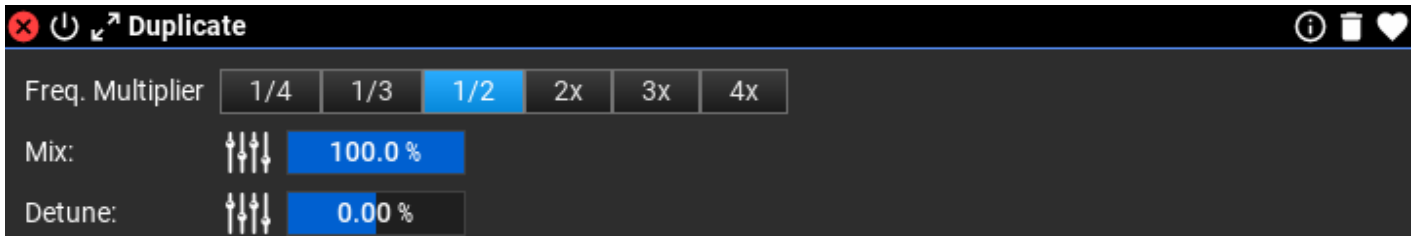


Detune mixes 1 to 8 detuned oscillators in the signal. Here you have MIDI controlled depth, mix and phase control for the detuned oscillators. It is very useful for creating supersaw/hypersaw presets and making 'thin' sounds 'fat'. Any waveforms are usable, not just sawtooth, but sawtooth and square sounds the best of the basic waveforms because of the strong harmonics. **Warning!** Detune multiplies the number of partials used!

## Detune Settings

- **Oscillators:** Number of oscillators which mean the number copies of the input partials
- **Detune (%)**: Detune amount from 0% to 100% [*minimum: 0.0 %; maximum: 100.0 %; default: 32.0 %*]
- **Mix (%)**: Detuned oscillator amplitude from 0% to 100% [*minimum: 0.0 %; maximum: 100.0 %; default: 100.0 %*]
- **Phases:** the initial phases of the oscillators. For best results, use "Offset" [*Same, Random, Offset*]

## Duplicate



Duplicate partials, multiply the duplicated frequencies and mix with the original partials. With detune option.

## Duplicate Settings

- **Freq. Multiplier:** Frequency multiplier. “1/2” means 1 octave below, “2x” means 1 octave above
- **Mix (%)**: Amplitude of the duplicated partials (0%-100%) [*minimum: 0.0 %; maximum: 100.0 %; default: 100.0 %*]
- **Detune (%)**: Detune amount for the duplicated partials (-2% - +2%) [*minimum: -2.0 %; maximum: 2.0 %; default: 0.0 %*]

## Gain

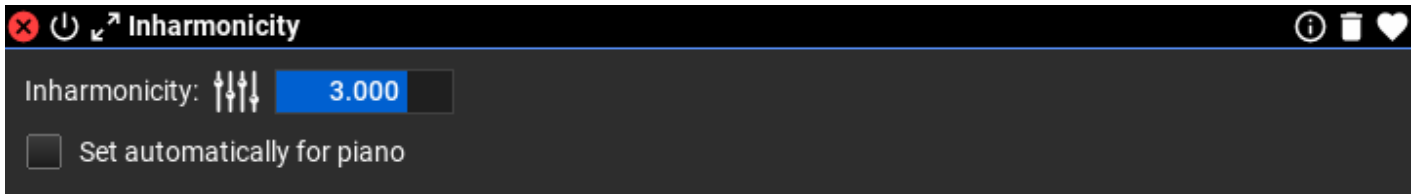


Amplify or attenuate incoming partials. Use this module for adjusting the partials volumes in a branch of the processing network. For global adjustments, the preset volume is to be used in the top bar.

## Gain Settings

- **Gain (dB)**: Amplification in decibel [*minimum: -60.00 dB; maximum: 36.00 dB; default: 0.00 dB*]

## Inharmonicity

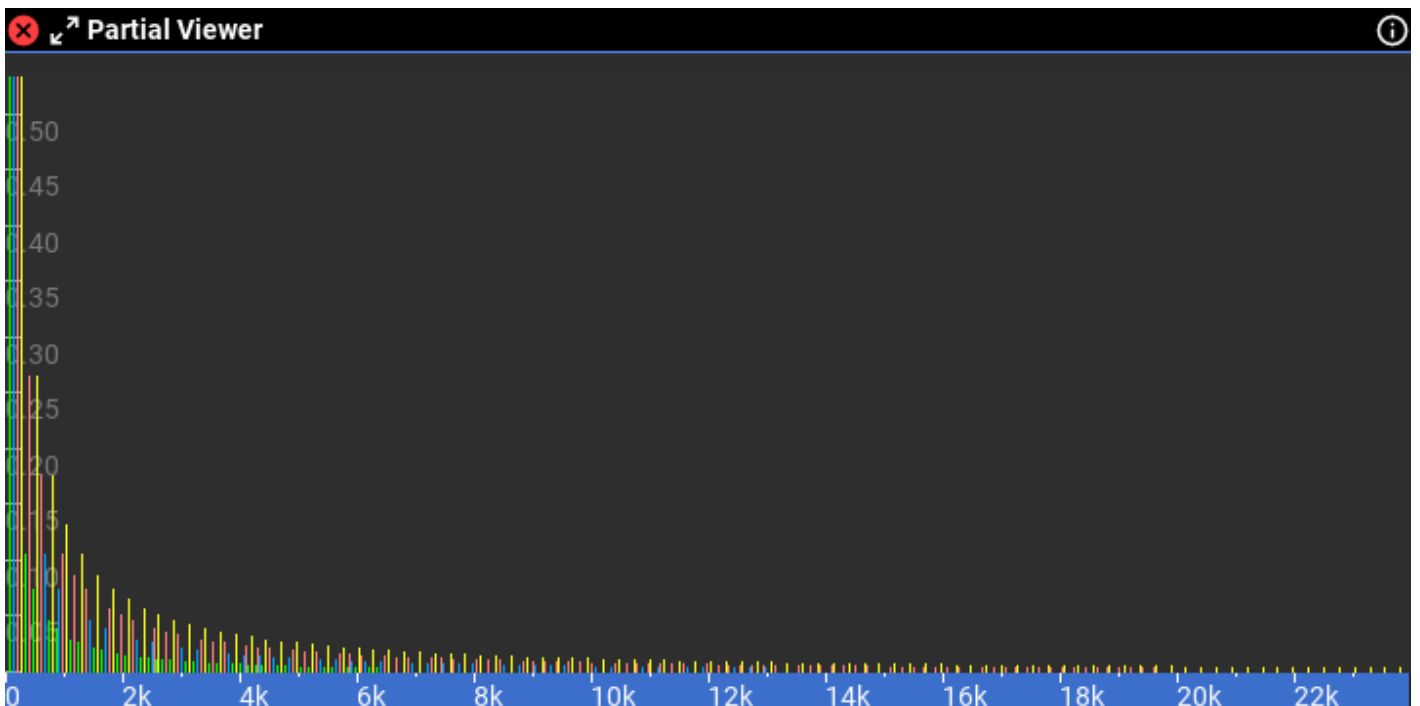


Inharmonicity is the degree to which the frequencies of partials (overtones) depart from whole multiples of the fundamental frequency. Inharmonicity is present in sounds produced by string instruments, such as the piano or the guitar and can be precisely simulated in additive synthesis.

## Inharmonicity Settings

- **Inharmonicity:** Inharmonicity amount; bigger values mean more inharmonicity [*minimum: 0.000 ; maximum: 4.000 ; default: 3.000*]
- **Set automatically for piano:** When enabled, the inharmonicity is calculated automatically for the piano based on the active MIDI note. In this case the 'Inharmonicity' setting is ignored.

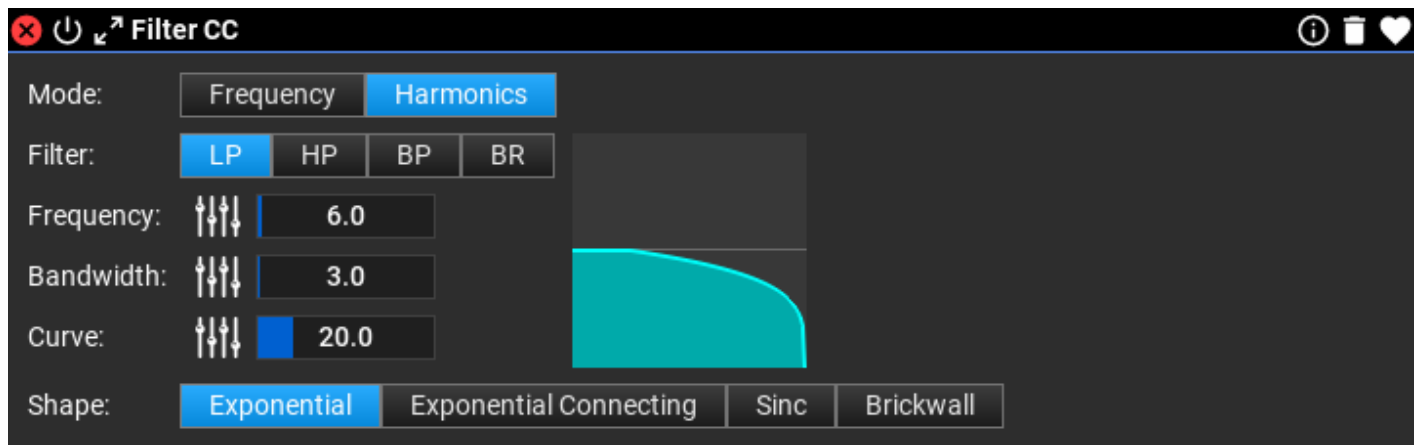
## Partial Viewer



Realtime partial display, useful during sound design.

## Simple MIDI CC controlled modules

### Filter CC

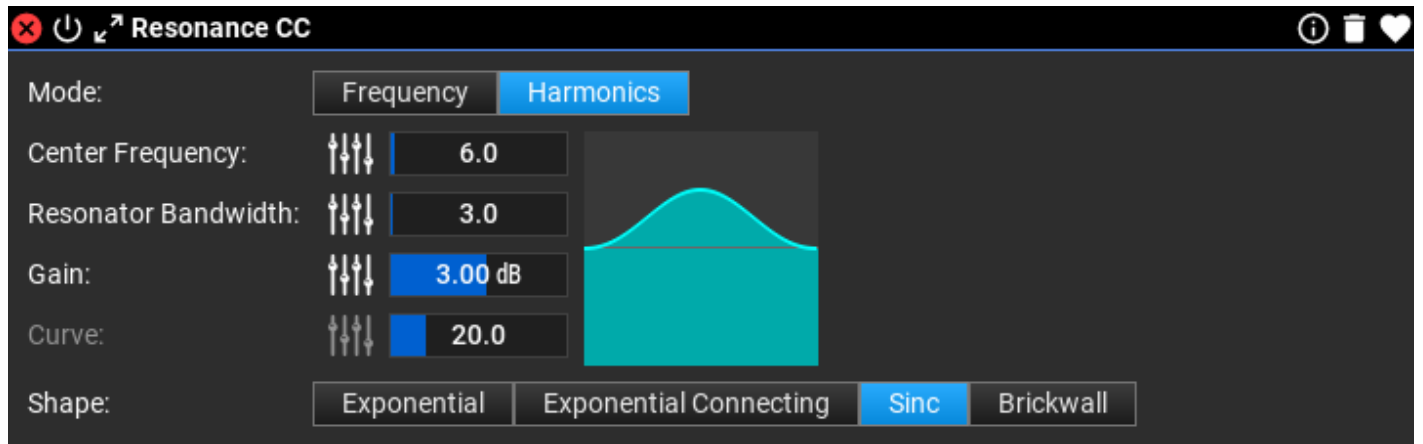


High-pass, low-pass, band-pass or band-reject filter controllable MIDI CC's or automation. 'Bandwidth' for HPF and LPF means the frequency range between the 0dB and fully attenuated signal. This filter works on either harmonics or absolute frequencies.

### Filter CC Settings

- **Mode:** Select working with absolute frequencies, or harmonics. Frequency and Bandwidth is expressed in Hertz or harmonic, depending on this setting.
- **Filter:** Filter type [*LP=low pass, HP=high pass, BP=band pass, BR=band reject*]
- **Frequency:** Filter cutoff frequency [*minimum: 0.0 ; maximum: 200.0/24000.0 ; default: 6.0*]
- **Bandwidth:** LP/HP: transition band between passband and stopband; BP/BR: bandwidth around center frequency [*minimum: 1.0 ; maximum: 200.0/24000.0 ; default: 3.0*]
- **Curve:** Filter curve slope [*minimum: 0.0 ; maximum: 100.0 ; default: 20.0*]
- **Shape:** Filter shape [*Exponential, Exponential Connecting, Sinc, Brickwall*]

## Resonance CC

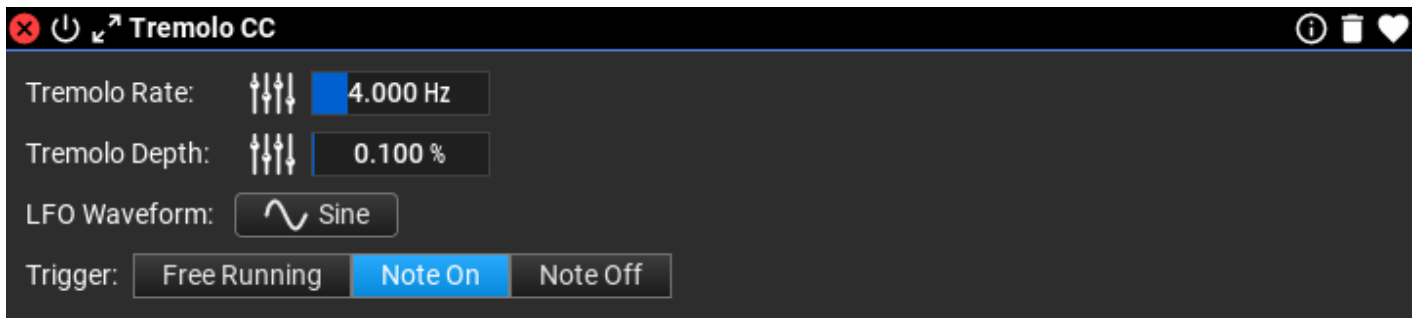


Resonant filter that is controlled by time or MIDI CC's. This filter makes a resonant peak in the spectrum. It works on either harmonics or absolute frequencies.

### Resonance CC Settings

- **Mode:** Select working with absolute frequencies, or harmonics. Center Frequency and Resonator Bandwidth is expressed in Hertz or harmonic, depending on this setting.
- **Center Frequency:** Resonance center frequency [*minimum: 0.0 ; maximum: 200.0/24000.0 ; default: 6.0*]
- **Resonator Bandwidth:** Resonance bandwidth [*minimum: 1.0 ; maximum: 200.0/24000.0 ; default: 3.0*]
- **Gain (dB):** Resonance gain in decibels [*minimum: -30.00 dB; maximum: 30.00 dB; default: 3.00 dB*]
- **Curve:** Resonance curve slope [*minimum: 0.0 ; maximum: 100.0 ; default: 20.0*]
- **Shape:** Resonance shape [*Exponential, Exponential Connecting, Sinc, Brickwall*]

## Tremolo CC

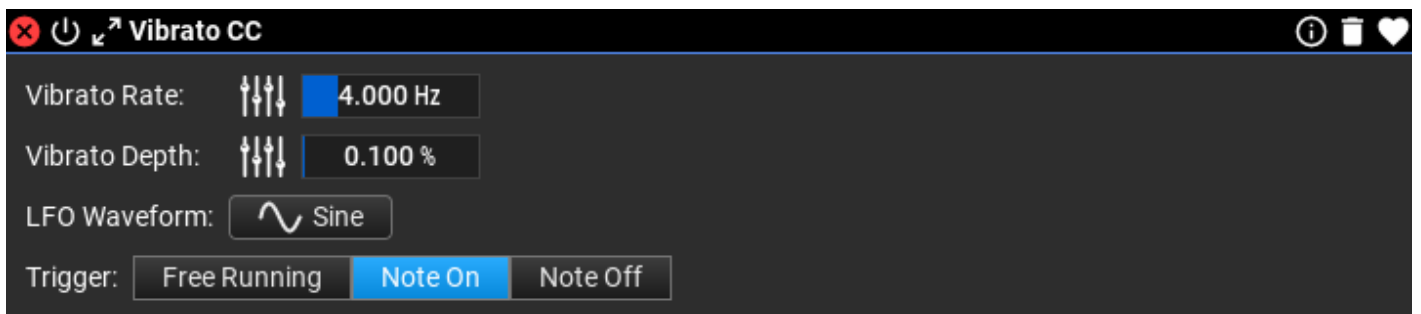


Tremolo effect controlled by MIDI CC's or automation. Note: when the rate is 0.0, you can use an automated parameter for the tremolo LFO. In this case the 'Trigger' setting is ignored, the automation trigger setting will be used.

## Tremolo CC Settings

- **Tremolo Rate** (Hz): Tremolo rate in Hz [*minimum: 0.000 Hz; maximum: 20.000 Hz; default: 4.000 Hz*]
- **Tremolo Depth** (%): Tremolo depth in percent [*minimum: 0.000 %; maximum: 100.000 %; default: 0.100 %*]
- **LFO Waveform**: select the LFO waveform. "Random Sine" waveforms are the sum of 3 sine waves with different frequencies [*Sine, Triangle, Saw Up, Saw Down, Square, Sine Squared, Sine Cubed, Square Root Sine, Random Sine 1, Random Sine 2*]
- **Trigger**: specify when the LFO waveform is triggered [*Free Running, Note On, Note Off*]

## Vibrato CC

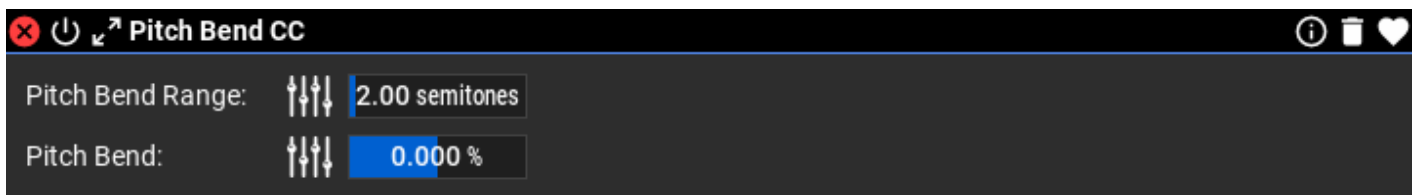


Vibrato effect controlled by MIDI CC's or automation. Note: when the rate is 0.0, you can use an automated parameter for the vibrato LFO. In this case the 'Trigger' setting is ignored, the automation trigger setting will be used.

## Vibrato CC Settings

- **Vibrato Rate** (Hz): Vibrato rate in Hz [*minimum: 0.000 Hz; maximum: 20.000 Hz; default: 4.000 Hz*]
- **Vibrato Depth** (%): Vibrato depth in percent [*minimum: 0.000 %; maximum: 100.000 %; default: 0.100 %*]
- **LFO Waveform**: select the LFO waveform. “Random Sine” waveforms are the sum of 3 sine waves with different frequencies [*Sine, Triangle, Saw Up, Saw Down, Square, Sine Squared, Sine Cubed, Square Root Sine, Random Sine 1, Random Sine 2*]
- **Trigger**: specify when the LFO waveform is triggered [*Free Running, Note On, Note Off*]

## Pitch Bend CC

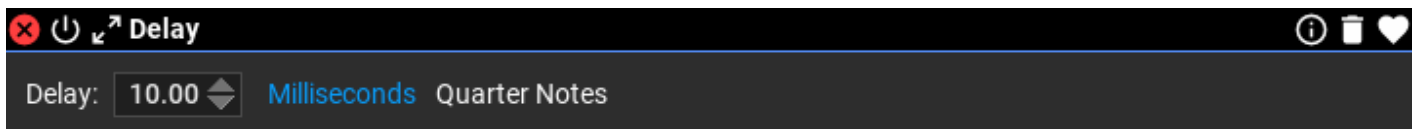


Pitch bending controlled by MIDI CC's or automation. Note that there is a global pitch bend setting for each preset, and partial sources use that.

## Pitch Bend CC Settings

- **Pitch Bend Range** (semitones): Pitch bend range in semitones [*minimum: 0.00 semitones; maximum: 48.00 semitones; default: 2.00 semitones*]
- **Pitch Bend** (%): Pitch bend between -100% and +100% [*minimum: -100.000 %; maximum: 100.000 %; default: 0.000 %*]

## Delay

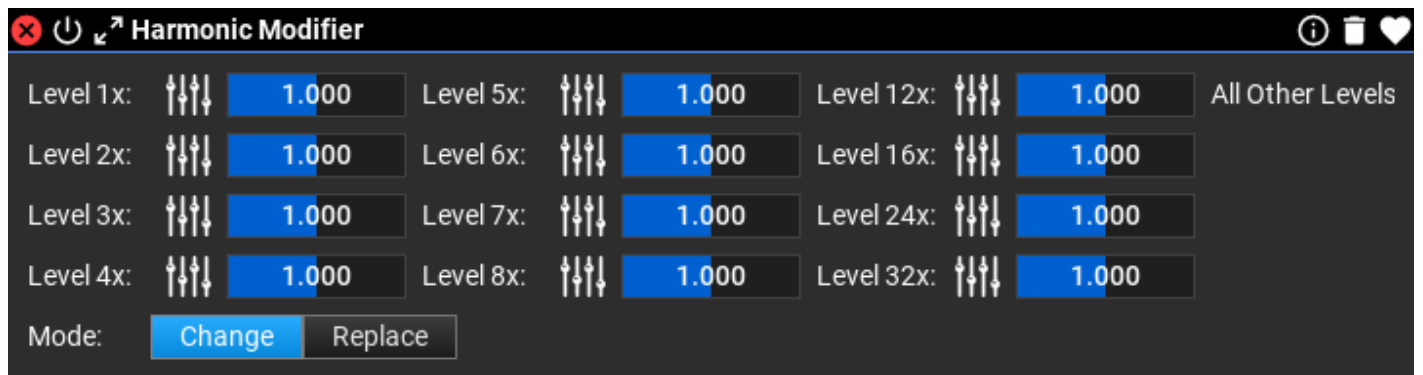


Simple delay up to 1000 milliseconds.

## Delay Settings

- **Delay:** in milliseconds or quarter tones.

## Harmonic Modifier



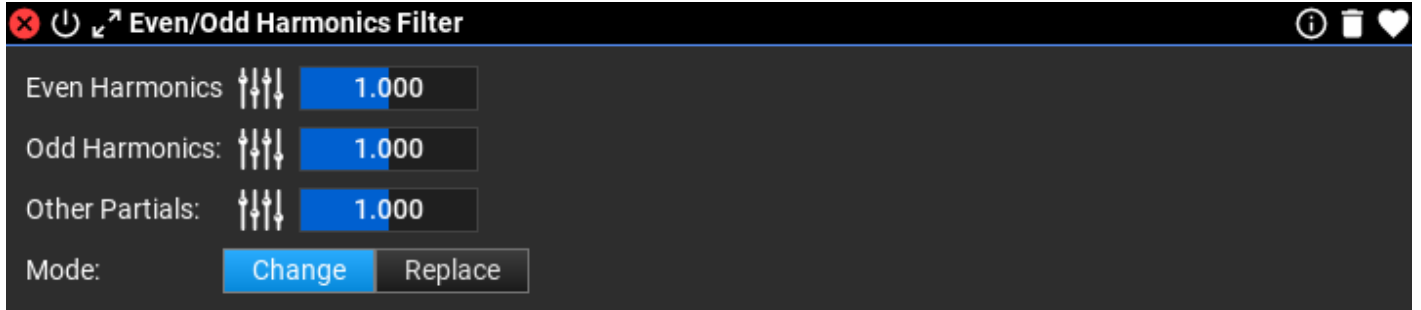
Replace or change important harmonics in an existing signal

## Harmonic Modifier Settings

- **Level 1x:** Level of the fundamental frequency [*minimum: 0.0 ; maximum: 4.0 ; default: 1.0*]
- **Level 2x:** Level of the 2nd harmonics [*minimum: 0.0 ; maximum: 4.0 ; default: 1.0*]
- **Level 3x:** Level of the 3rd harmonics [*minimum: 0.0 ; maximum: 4.0 ; default: 1.0*]
- **Level 4x:** Level of the 4th harmonics [*minimum: 0.0 ; maximum: 4.0 ; default: 1.0*]
- **Level 5x:** Level of the 5th harmonics [*minimum: 0.0 ; maximum: 4.0 ; default: 1.0*]
- **Level 6x:** Level of the 6th harmonics [*minimum: 0.0 ; maximum: 4.0 ; default: 1.0*]
- **Level 7x:** Level of the 7th harmonics [*minimum: 0.0 ; maximum: 4.0 ; default: 1.0*]
- **Level 8x:** Level of the 8th harmonics [*minimum: 0.0 ; maximum: 4.0 ; default: 1.0*]
- **Level 12x:** Level of the 12th harmonics [*minimum: 0.0 ; maximum: 4.0 ; default: 1.0*]
- **Level 16x:** Level of the 16th harmonics [*minimum: 0.0 ; maximum: 4.0 ; default: 1.0*]
- **Level 24x:** Level of the 24th harmonics [*minimum: 0.0 ; maximum: 4.0 ; default: 1.0*]
- **Level 32x:** Level of the 32nd harmonics [*minimum: 0.0 ; maximum: 4.0 ; default: 1.0*]
- **All Other Levels:** Level of all other harmonics, and partials that are not harmonics [*minimum: 0.0 ; maximum: 4.0 ; default: 1.0*]
- **Mode:** Change: multiply the harmonics with the values set; Replace: set the harmonic



## Even/Odd Harmonics Filter



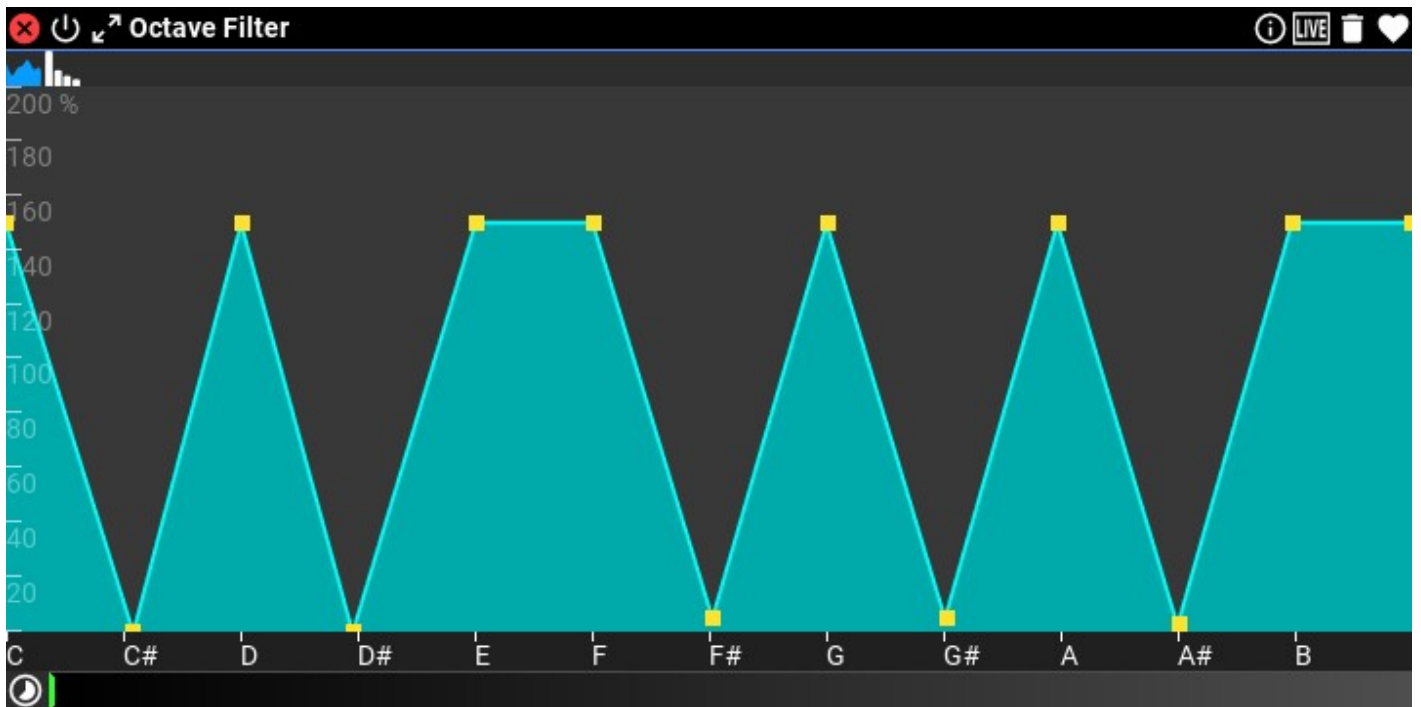
MIDI controlled filter working on even and odd harmonics.

### Even/Odd Harmonics Filter Settings

- **Even Harmonics:** Level of even harmonics [*minimum: 0.0 ; maximum: 4.0 ; default: 1.0*]
- **Odd Harmonics:** Level of odd harmonics [*minimum: 0.0 ; maximum: 4.0 ; default: 1.0*]
- **Other Partial:** Level of other partials that are not integer multiple of the fundamental frequency [*minimum: 0.0 ; maximum: 4.0 ; default: 1.0*]
- **Mode:** Change: multiply the harmonics with the values set; Replace: set the harmonic


## Experimental modules


### Octave Filter



The connection between harmonics and musical notes. Octave filter amplifies/attenuates partials in octave distance. You specify the filter curve for one octave, it is used for all octaves. The filter can be controlled by time or MIDI CC's.

## Octave Tool Bar

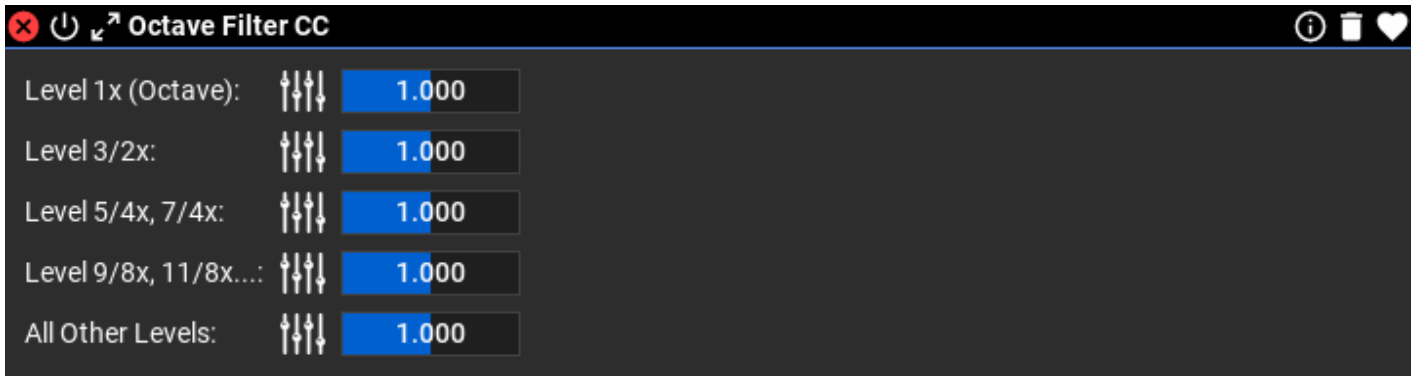
 : operate on absolute frequencies (musical notes). The scale displays musical notes in one octave.

 : operate on partials. The scale displays harmonics from 1 to 2 (that is one octave). The same will be applied to harmonics 2 to 4, 4 to 8, 8 to 16, etc.

## Octave Filter Settings

- **Octave Filter Timeline (%)**: Octave Filter timeline [*minimum: 0.0 %; maximum: 100.0 %; default: 0.0 %*]

## Octave Filter CC

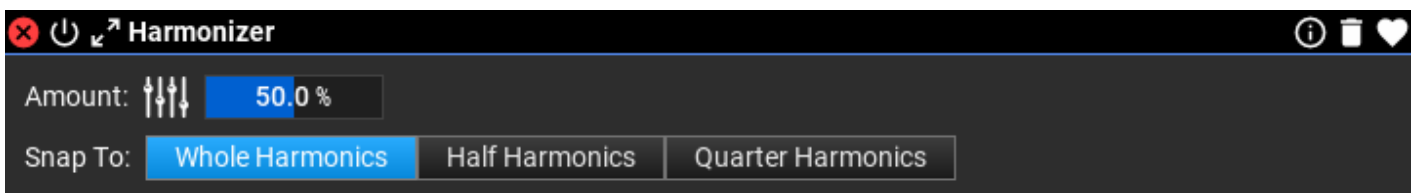


MIDI controlled octave filter, that allows certain harmonics. The way it works: all harmonics (multipliers of fundamental frequency) are transformed down between 1 and 2.

## Octave Filter CC Settings

- **Level 1x (Octave):** Level of harmonics at octave distance: 1, 2, 4, 8, 16, etc times the fundamental frequency [*minimum: 0.000 ; maximum: 4.000 ; default: 1.000*]
- **Level 3/2x:** Level of harmonics half way between 1 and 2: 3, 6, 12, 24, 48, etc times the fundamental frequency [*minimum: 0.000 ; maximum: 4.000 ; default: 1.000*]
- **Level 5/4x, 7/4x:** Level of harmonics 5, 7, 10, 14, 20, 28, etc. [*minimum: 0.000 ; maximum: 4.000 ; default: 1.000*]
- **Level 9/8x, 11/8x...:** Level of harmonics 9, 11, 13, 15, 18, 22, etc [*minimum: 0.000 ; maximum: 4.000 ; default: 1.000*]
- **All Other Levels:** Level of all other harmonics not belonging to previous groups [*minimum: 0.000 ; maximum: 4.000 ; default: 1.000*]

## Harmonizer

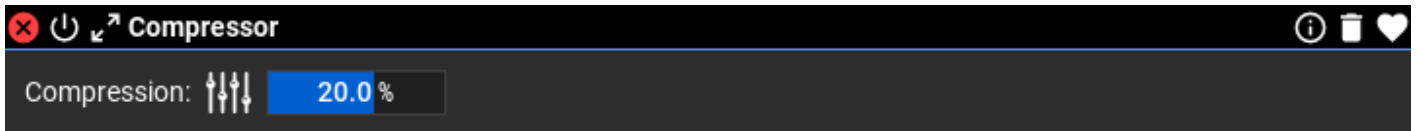


Move partials to nearest harmonics (whole number multiple of fundamental frequency). There is an option to use half (e.g. 1.5x, 2.5x...) or quarter harmonics (1.25x, 1.5x, 1.75x...)

## Harmonizer Settings

- **Amount (%)**: Amount of harmonization (0%-100%) [*minimum: 0.0 %; maximum: 100.0 %; default: 50.0 %*]

## Compressor

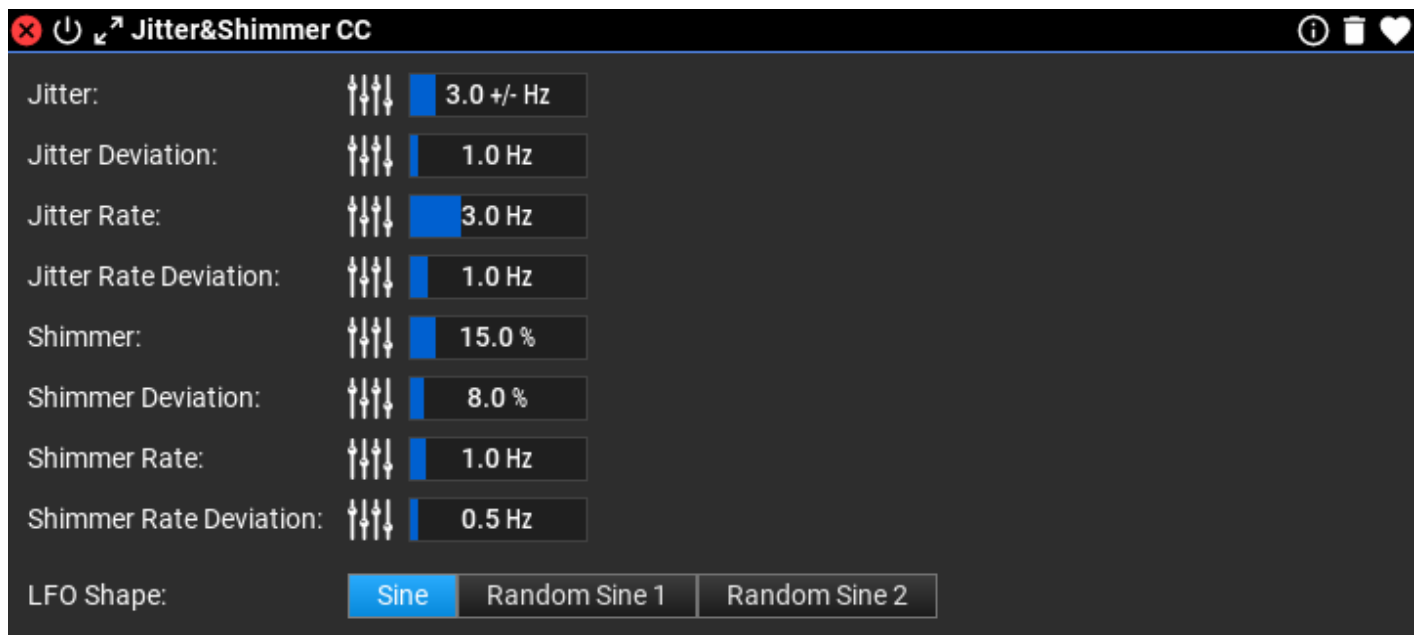


Compressor changes the proportions between quiet and loud frequencies. For values 0 to 100% it amplifies quiet frequencies and attenuates loud frequencies. For negative values it makes loud partials even louder, and attenuates quiet partials.

## Compressor Settings

- **Compression (%)**: Values 0% to 100% accentuate quiet frequencies and attenuate loud frequencies. Negative values make loud partials even louder, and attenuate quiet partials. [*minimum: -100.0 %; maximum: 100.0 %; default: 20.0 %*]

## Jitter&Shimmer CC

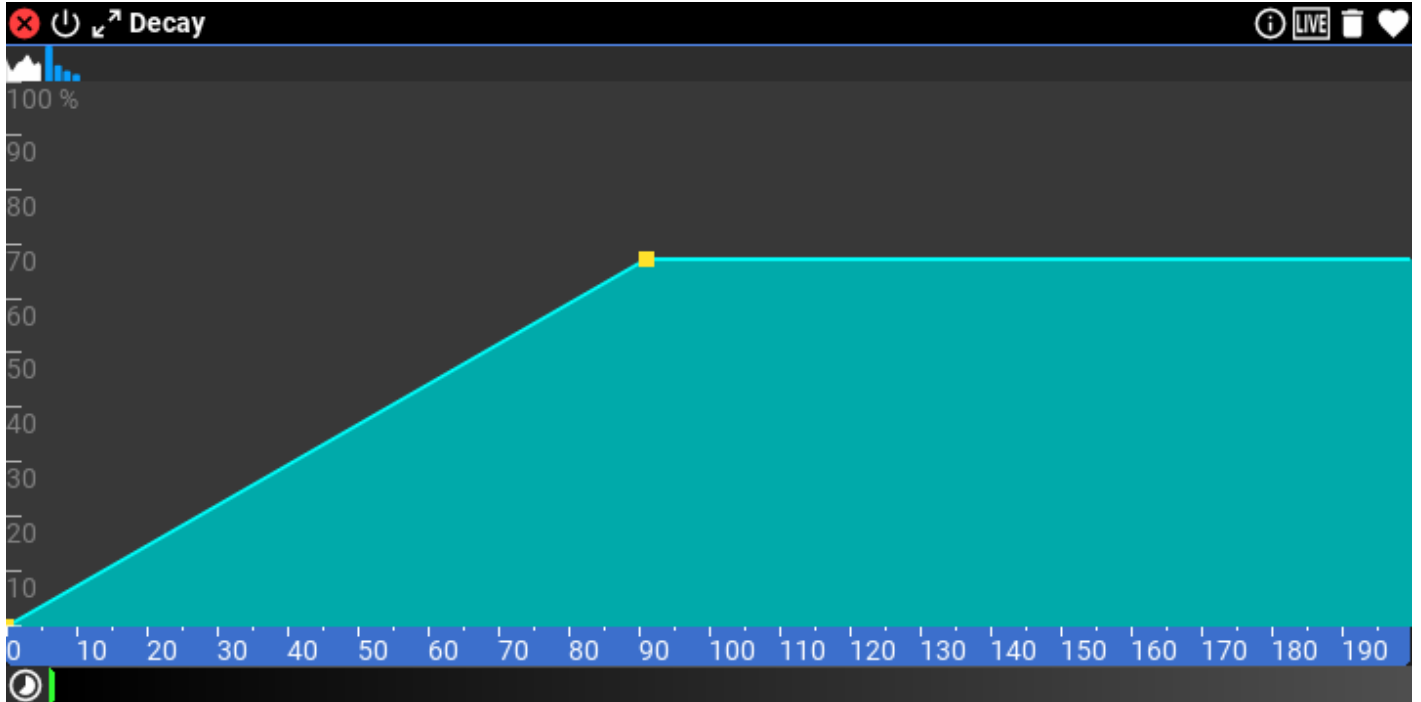


This module introduces random changes in partial frequency (jitter) and amplitude (shimmer) to make sounds more natural. The best presets all have some fluctuations for partials, both amplitudes and frequencies.

## Jitter&Shimmer CC Settings


- **Jitter** (+/- Hz): Average fluctuation of partial frequencies (Hz) [*minimum: 0.0 +/- Hz; maximum: 20.0 +/- Hz; default: 3.0 +/- Hz*]
- **Jitter Deviation** (Hz): Maximum deviation from average fluctuation (Hz) [*minimum: 0.0 Hz; maximum: 20.0 Hz; default: 1.0 Hz*]
- **Jitter Rate** (Hz): Average fluctuation rate of partial frequencies (Hz) [*minimum: 0.1 Hz; maximum: 10.0 Hz; default: 3.0 Hz*]
- **Jitter Rate Deviation** (Hz): Maximum deviation from average fluctuation rate (Hz) [*minimum: 0.0 Hz; maximum: 10.0 Hz; default: 1.0 Hz*]
- **Shimmer** (%): Average fluctuation of partial amplitudes (%) [*minimum: 0.0 %; maximum: 100.0 %; default: 15.0 %*]
- **Shimmer Deviation** (%): Maximum deviation from average fluctuation (%) [*minimum: 0.0 %; maximum: 100.0 %; default: 8.0 %*]
- **Shimmer Rate** (Hz): Average fluctuation rate of partial amplitudes (Hz) [*minimum: 0.1 Hz; maximum: 10.0 Hz; default: 1.0 Hz*]
- **Shimmer Rate Deviation** (Hz): Maximum deviation from average fluctuation rate (Hz) [*minimum: 0.0 Hz; maximum: 10.0 Hz; default: 0.5 Hz*]


# Decay



Each partial has its own decay rate when using this module. If the decay is 0%, there is no decay, the partial is sustained. The bigger the decay rate the faster the decay is. Decay is set up as a function of *absolute* or *partial* frequency. Time cannot be used, only MIDI CC to set up the decay envelopes.

## Decay Tool Bar

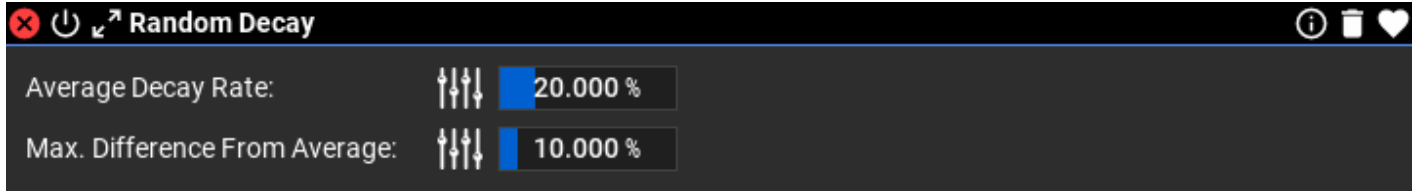
 : operate on absolute frequencies. The scale displays frequency from zero to half the sampling rate in Hertz.

 : operate on partials. The scale displays harmonics. Right click on the scale to set the number of harmonics to display

## Decay Settings

- **Decay Rate Timeline (%)**: Decay Rate timeline [*minimum: 0.0 %; maximum: 100.0 %; default: 0.0 %*]

# Random Decay



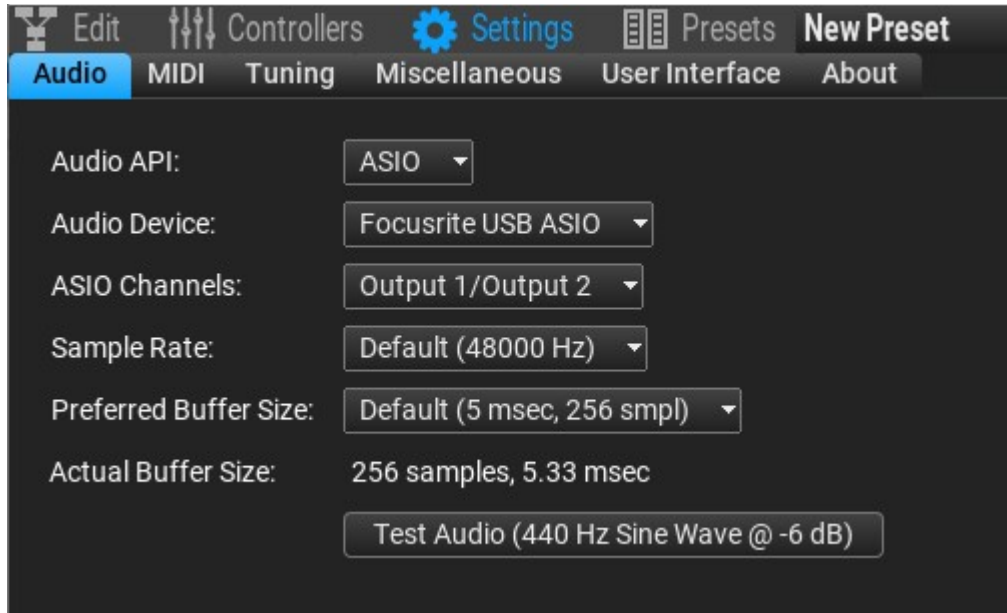
Each partial has its own decay rate which is set up randomly. You can set up an average decay and a maximum difference from the average decay. Decay 0% means no decay, 100% means very fast decay of a partial amplitude. It is useful for simulating instruments where partials have different decay times (e.g. cymbal).

## Random Decay Settings

- **Average Decay Rate (%)**: Average decay rate used for partials [*minimum: 0.000 %; maximum: 100.000 %; default: 20.000 %*]
- **Max. Difference From Average (%)**: Maximum random difference from the average decay rate [*minimum: 0.000 %; maximum: 100.000 %; default: 10.000 %*]

# Settings

Accessing the program global settings is possible by clicking on **Settings** in the top bar:



**Note:** *Audio and MIDI settings are shown only for the standalone application.*

## Audio

You can set the audio API, device, channels, sampling rate, and preferred buffer size. Not all settings are available for all API/device combinations. Check if audio works by clicking on the "Test Audio" button.

**Note:** *on Windows it is recommended to use a low latency driver, like ASIO*

## MIDI

The MIDI input can be selected on this page.



# Tuning

Select from dozens of tuning presets, with Equal Temperament being the default. Base note and Middle “A” note frequency can also be set here. The presets are stored in

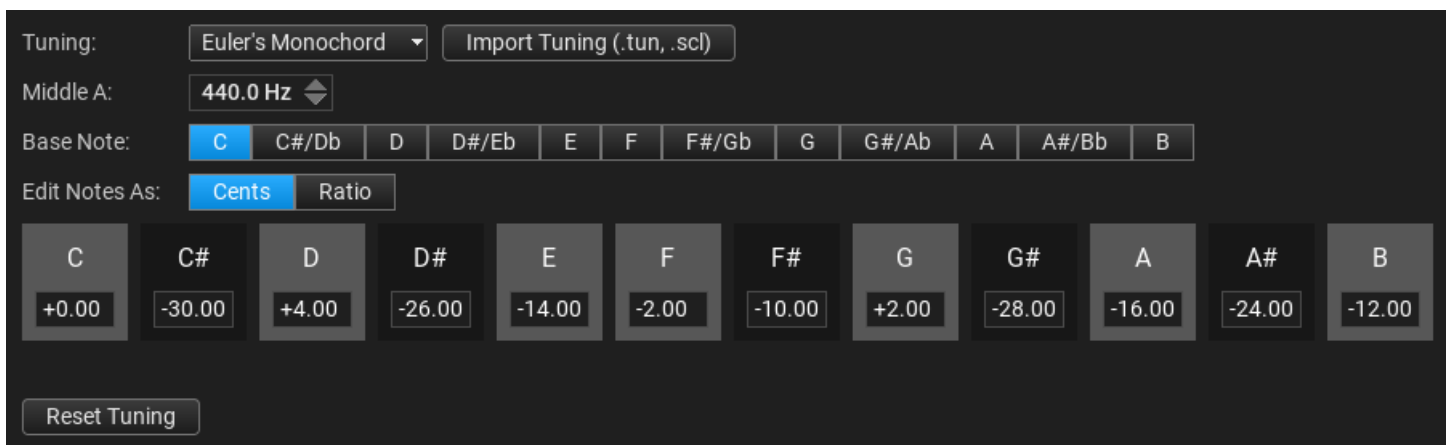
`C:\Users\\Documents\Syne\Tunings\TuningPresets.txt`

on Windows, and in

`~/Documents/Syne/Tunings/TuningPresets.txt`

on macOS. The presets file is a text file that can be modified, or new tunings can be added.

The currently selected tuning can be edited, either by entering cents or ratios for each note:



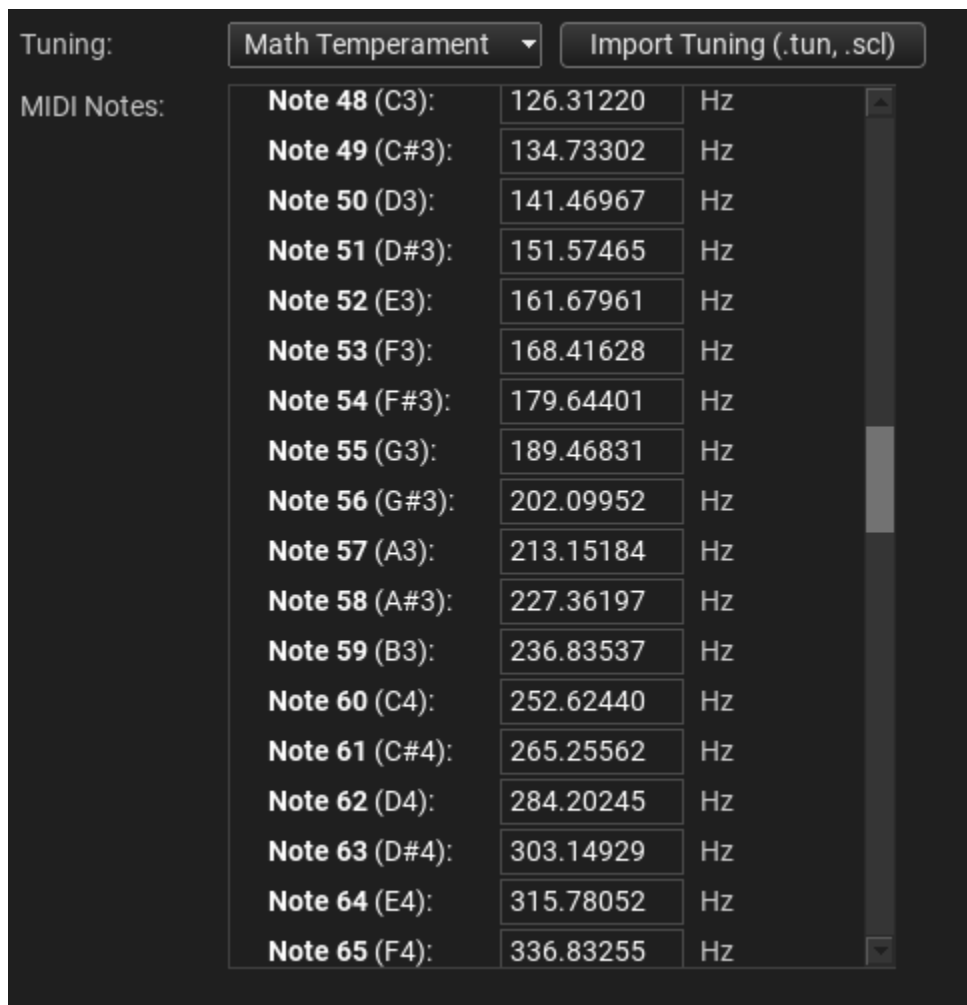
The screenshot shows the Syne tuning interface. At the top, there is a dropdown menu for 'Tuning' set to 'Euler's Monochord' and a button for 'Import Tuning (.tun, .scl)'. Below that is a 'Middle A:' field with a value of '440.0 Hz'. The 'Base Note:' section has a row of buttons for notes: C, C#/Db, D, D#/Eb, E, F, F#/Gb, G, G#/Ab, A, A#/Bb, B. The 'C' button is selected. Below this is an 'Edit Notes As:' section with 'Cents' and 'Ratio' buttons, where 'Cents' is selected. The main part of the interface is a table of 12 notes with their corresponding cent adjustments:

Note	Adjustment (Cents)
C	+0.00
C#	-30.00
D	+4.00
D#	-26.00
E	-14.00
F	-2.00
F#	-10.00
G	+2.00
G#	-28.00
A	-16.00
A#	-24.00
B	-12.00

At the bottom left, there is a 'Reset Tuning' button.

## Microtuning support

Scala (.SCL) and AnaMark (.TUN) files can be imported. The imported tuning sets up a table with frequencies for each MIDI note from 0 to 127. The frequencies are displayed in a list. Click on a frequency value to change:



## Saving tuning settings

The current tuning is embedded in presets, and can also be saved as a tuning preset (.syt file extension) by clicking on “Save Tuning”. The tuning preset file includes all editing made for note frequencies or cents in a single octave. You can load a .syt file by clicking on “Import Tuning”.

## Miscellaneous

Explanations for the various settings on this page:

### Presets

- **Preset Author Name:** author name embedded in presets. This is important if you intend to share presets online. By default a random ID is generated.

- **Load Online Presets:** You can enable or disable loading online presets.
- **Replace ADSR Attack Level In Loaded Presets:** This is a useful setting for replacing the velocity curve in the ADSR because all presets include its own ADSR rather than having a global ADSR envelope setting.

## Editing

- **Center Layout When...:** You can place the modules in the center of the workspace at a default zoom level when you add/remove, connect/disconnect modules, and when loading a preset
- **Default Maximum LFO Rate In Editors:** Maximum LFO rate displayed in the editors from 5 to 100 Hz
- **Default Volume For New Presets:** volume setting when you press “New Preset”
- **Show Partial Amplitudes as dB:** You can display decibels on the vertical scale by clicking on the scale. This is the default setting.
- **Maximum Amplitude dB:** Decibel displayed for the biggest amplitude partial
- **dB's To Display For Partial Amplitudes:** Number of decibels to display for partial amplitudes when dB display is enabled
- **Automatically Enable Live Mode:** In LIVE mode envelopes for all active notes are displayed for modules that support that. LIVE mode can be enabled automatically when there is a note sounding. When all notes are turned off, LIVE mode is disabled.

## Help

- **Enable Pop-up Help:** When enabled, you will see a help message when the mouse is over a UI element
- **Pop-up Help Delay:** The delay before a pop-up help appears when you leave the mouse over a UI element

# User Interface

**Syne** has a very flexible user interface: you can change colors, adjust font sizes, button shapes, shading and import/export UI themes. Setting the UI rendering engine is possible. By default hardware accelerated rendering is used (metal on macOS and Direct3D on Windows) but it is possible to select a different driver, like OpenGL or software rendering, when there is a rendering issue (e.g. flickering).

# About

Version and build date is displayed on this page. You can check for updates, measure the

processor performance, open the on-line pdf user guide or send bug reports.

## Checking for updates

Click on “Check For Updates”. If there is an update available, the program offers downloading it. **Syne** does not start installation, and does not install anything automatically, you need to start the installer manually.

## Measuring CPU performance

A simple measurement will take place to estimate the number of partials that your processor can handle on a single processor core. The result is an approximate number and may slightly vary for each run.

## Opening the user guide

Clicking on “Open User Guide” will open your web browser with the user guide URL. The user guide is available on-line: <https://www.musicdevelopments.com/UserGuide.pdf>

## Reporting bugs

Pressing the “Send Bug Report” button opens the standard “mailto:” URL handler on your computer. In some cases this is not configured (e.g. when using a web mail). In this case please send us your questions, suggestions and bug reports to syne at musicdevelopments dot com with as much information as possible: OS version, plug-in host version, **Syne** version, the steps required to reproduce the issue. You can include a problematic preset (with .syne file extension) as an attachment.

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