

# SIGMund<sup>2</sup>

HIGH QUALITY FLEXIBLE DELAY UNIT



## User Manual

## Requirements

### Software and hardware requirements:



#### Windows PC

<b>OS version</b>	Windows 7 or newer
<b>CPU</b>	Intel x86 / AMD x86
<b>Software</b>	VST2 / VST3 / AAX compatible host application (64bit)
<b>Sample rate</b>	≥44.1 kHz



#### Apple Mac

<b>OS version</b>	OS X 10.13 or newer
<b>CPU</b>	Intel x86 / Apple Silicon
<b>Software</b>	AU / VST2 / VST3 / AAX compatible host application (64bit!)
<b>Sample rate</b>	≥44.1 kHz

*Hardware requirements / recommendations are based on estimates performed on available computers at D16 Group HQ, and therefore cannot cover all possible configurations available on the market. CPU usage may vary widely depending on the manner in which the product is used. Factors that may contribute to variance in CPU usage include particular patch and its complexity, the global quality setting, project sample rate. In order to form a better understanding of how a plug-in will behave within your current setup, we highly recommend downloading the demo and giving it a try.*

## Preliminary information

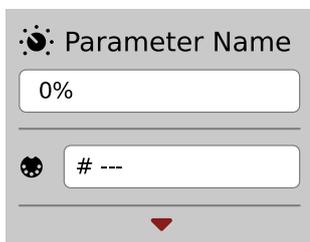
This chapter contains general advice for using the plug-in's interface.

### To do a right-click on macOS with single button mouse:

Either click your mouse while holding the CTRL key on your keyboard or use two fingers on your touchpad.

### Checking the value of a parameter

Right-click on any parameter to check its value in its context menu:



*A parameter's context menu*

*Note: It's currently not possible to enter a precise value in the input box; it's just to check the value.*

### Fine-tuning continuous parameters

Tweak a control (knob) while holding the CTRL key (on Windows) or Apple CMD key (on macOS) - this will make the tweaking more precise while moving the mouse pointer up and down.

### Double-click to reset a continuous parameter's value

Double-clicking on a parameter restores its value to the initial state, either default (right after loading the plug-in / loading it along with a project file) or from the most recently loaded preset.

# Overview

Sigmund 2 is a *Multi Tap Delay* type effect with four identical and independent **Delay Lines**, which can be connected together in a few different manners / topologies.

After loading the plug-in to the host application, the following graphical interface appears:



Sigmund's Graphical User Interface

The following elements can be distinguished on the GUI:

## Delay line section

The parameters section of a chosen **Delay Line** (one of four available):



The Delay Line parameters

## The modulator section

Parameters for a **Modulator** (one of four available), which can influence certain internal parameters of **Delay Lines**.



*The Modulator section*

## The mixer section

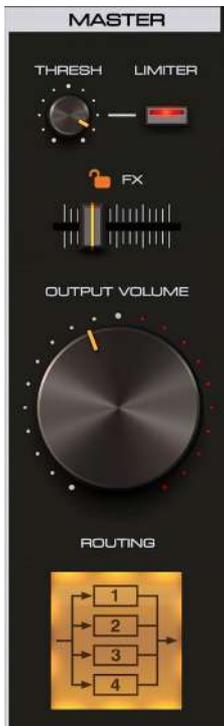
This part of the interface controls the process of mixing the **Delay Lines**' signal outputs.



*The Delay Lines mixer*

## The master section

This applies the final touch (**Limiter + Output Volume**) before passing the sound to the audio output and enables one of nine available configurations / connection topologies of the **Delay Lines (Routing)**.



*The Master section*

## The preset section

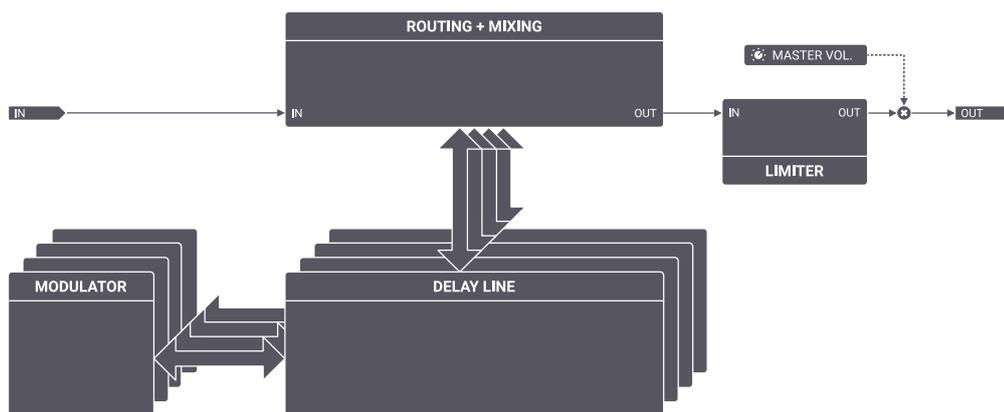
Here, you can browse and manage presets, and save your current settings as a new preset. This section consists of:

- **Preset display** - Opens a browser to load, save and manage presets (more on this in the **Preset Management** part of the manual).
- **Save button** - Saves the current sound settings as a new preset.

## Signal flow

This chapter focuses on the plug-in signal's processing route, describing the components and controlling parameters that can be found throughout the graphical interface.

The plug-in's general signal flow is pictured below:

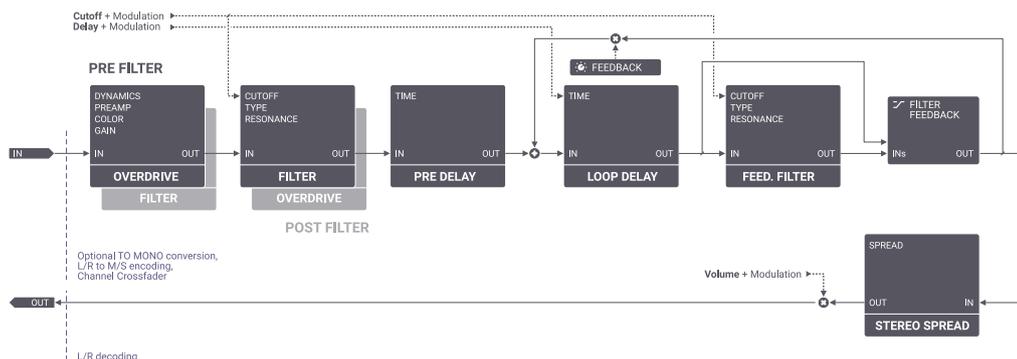


A diagram showing the plug-in signal flow

The signal is transferred from the input to the **Router** module, which sends the signal TO the **Delay Lines** and BACK; the signal is sent to the **Delay Lines** according to the selected Topology map in the routing section, found at the bottom right of the GUI. For example, the signal can be processed in parallel through **Delay Lines** independently, in serial from the output of one line to the input of the next, or in a mixed manner, where some **Delay Lines** are connected in parallel and others in serial. After the signal reaches the end of the chosen route, it is transferred to the plug-in's output, after passing through the **Limiter**.

## Delay lines

The most important element of the entire effect is the **Delay Line** module. As previously mentioned, there are four **Delay Lines** available and every line has the same set of parameters.



A diagram showing signal flow along a single Delay Line

The above picture presents a circuit diagram of **Sigmund's Delay Line**, in which the signal, while passing through the **Router**, passes in sequence through the following modules:

- **Overdrive** distortion with an optional preliminary **Dynamics** compressor.
- **Multimode Resonant Filter** (this may also come before the **Overdrive**, depending on **Pre Filter** state).
- **Pre Delay** - Initial signal delay.
- The signal then enters the feedback loop and is processed, in order, by:
  - **Loop Delay** - Feedback delay module,
  - The optional **Passive Feedback Filter**, which shares cutoff frequency with the **Multimode Resonant Filter**.
- **Feedback** - A certain part of the signal, defined by the **Feedback** parameter, returns to the beginning of the loop; this causes an echo effect or comb filtering, in the case of very small loop delays.
- **Stereo Spread** - On leaving the loop, the signal enters the **Stereo Spread** block, which additionally delays one of the *Left / Right* channels (or *Mid / Side* depending on the given **Delay Line's** channel mode) in phase, according to a provided time interval.
- **Volume Modulation** - The signal then goes through the amplitude modulator. As well as **Volume**, **Cutoff** frequency and loop **Delay** can also be subjected to modulation - a process which will be explained in detail later on.

The delay control parameters can be found in the **Delay Line** section on the GUI:



The Delay Line parameters section

You can choose one of the four **Delay Lines** to edit by using a button selector in the header:



Selecting which Delay Line to edit

The buttons work in radio mode; the backlights inside the buttons and number in the upper left corner of the **Delay Line** section indicate which line is currently chosen:



The number of the currently selected Delay Line

## Signal pre-processing

Firstly, a signal that enters the selected delay line goes through a **Multimode Resonant Filter** and an **Overdrive** distortion module:



The Filter and Overdrive sections

### The multimode resonant filter

The **Multimode Resonant Filter** is situated in the **Filter** subsection:



The Filter subsection

The **Multimode Resonant Filter** is controlled by the following parameters:

- **Cutoff** - Filter cutoff frequency
- **Reso** - Filter resonance level
- **Type** - Filter type:
  - Low-pass
  - Band-pass
  - High-pass
  - Band-reject
- **Feedback** - Activates the passive, in-loop (delay loop) filter

The toggle LED next to the **Filter** label of this section activates / deactivates the effect.

### The feedback filter

The **Feedback Filter** is an additional in-loop filter; the filter **Type** and **Cutoff** frequency are controlled by the same parameters as the **Multimode Resonant Filter** (the parameters for both filters are linked). By default, the filter in the loop is inactive and it can be activated with the **Feedback** button (working in toggle mode).

When the in-loop filter is active, the signal is filtered by a passive filter each time it passes through the feedback loop, as well as by the **Multimode Filter** before passing into the feedback loop.

If the **Multimode Filter** is disabled (the **Enable** button in the **Filter** section), then the **Feedback Filter** in the feedback loop remains inactive.

## The overdrive distortion module

The **Overdrive** distortion module is located in the **Overdrive** section and controlled by the following parameters:



The Overdrive section

- **Dynamics** - Controls dynamic compression before the signal gets amplified and distorted. Turn clockwise to increase the input signal compression prior to pre-amplification.
- **Type** - Chooses between the available models for **Dynamics** compression.
- **Preamp** - Controls the signal amplification before symmetrical diode-clipper distortion.
- **Color** - Controls the distortion type; a low value of **Color** will result in a subdued sound with additional harmonics in the low and medium band. The higher the value of **Color**, the more harmonics appear in the higher bands and fewer in the lower and medium bands.
- **Gain** - Controls the output volume of the distortion module.
- **Prefilter** - Determines the sequence in which the input signal is processed by the **Overdrive** and **Multimode Resonant Filter**:
  - **Disabled** - The signal passes through the **Resonant Filter**, then the **Overdrive** module.
  - **Enabled** - The signal passes through the **Overdrive** module and is then **Filtered**.

The toggle LED next to the **Overdrive** label of this section activates / deactivates the effect.

## Remarks

Both modules described above (**Multimode Resonant Filter** and **Overdrive**) are situated in the delay line just before the feedback loop's summing node. Therefore, before the signal is processed in the delay line, it is processed by both aforementioned modules.

## Pre delay and loop delay

The successive processing elements in the delay line are:

- **Pre Delay module** - Delays the signal by a provided time interval before passing it to the feedback loop.
- **Loop Delay module** - Controls the signal delay within the feedback loop.

Pre Delay and Loop Delay subsections on the GUI:



The Pre Delay and Loop Delay subsections

The parameters in both sections are similar.

## Delay time

The central display shows the **Delay Time**:



Non-synchronized Delay Time

The value is set in *milliseconds* ranging from **0.1** to **1000**. The values of delays for the *Left* and *Right* channels (or *Mid / Side*) can be changed independently by using the potentiometers on either side of the display.



The Delay Time knobs

Alternatively, the values can be set precisely by dragging an individual digit to modify a specific decimal place.

## Delay line tempo synchronization

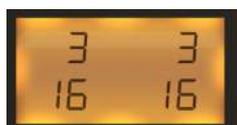
The **Delay Time** can be synchronized with the host application tempo. Synchronization is activated with the **Sync** button (independently for **Pre** and **Loop** delays).

Activating or deactivating the **Sync** button also changes the **Time** parameter display and the set of available controls / parameters. When **Sync** is active, the sections appear as below:



The Pre Delay and Loop Delay sections with Sync activated

The **Time** display shows the current values of delays for both channels (**L** and **R** in **L/R** mode or **M** and **S** in **M/S** mode) in the form of common fractions. On the left side, the delay of the *Left (Mid)* channel is displayed and, on the right side, the delay of the *Right (Side)* channel is displayed:



The Time display with Sync mode activated

Dragging the mouse cursor over a numerator or denominator will change the value independently, influencing the rhythmical values of delays.

Full, Dot and Tri LEDs on both sides of the display are modifiers of rhythmical values set on the display:



Rhythmic modifiers for rate value

- **Full** - Full note, in accordance with the display
- **Dot** - Note with a dot
- **Tri** - Triplet

## Tempo tap

The tempo tap function lets you quickly set the delay time by repeatedly pressing the **Tap** button (for *Left* and *Right* channels). The average times between several clicks are measured and afterwards set as the **Delay Line** time for that respective channel.



The tempo tap buttons

The buttons are available in both *Synced* and *Non-synced Delay Line* modes.

## The channel link

The channel link lets you set the delay times for both channels (*Left* and *Right*) simultaneously. A change to the *Left* channel delay will immediately cause an identical update in the *Right* channel delay and vice versa.

This mode is activated by the **Link** button and works for both the **Pre Delay** and **Loop Delay**, regardless of whether it is in **Sync** mode or not (**Sync** button).



A channel link for a Delay Line

## Feedback

Feedback parameters are edited in the **Loop Delay** subsection:



The Feedback subsection

There are two parameters available in this section:

- **Feedback** - This can be set as a positive or negative feedback with the zero value in the center:
  - **Zero Value** - No feedback; the sound is passed on once at the interval set in the loop delay module and does not return to the beginning of the loop.
  - **Positive Feedback** - The signal delayed by the **Loop Delay** module is added to the signal on the loop input proportionally to the value of the parameter. The larger the value of the **Feedback** parameter, the larger part of the signal is passed on to the line input, causing the sound to take longer to fade (more echoes).
  - **Negative Feedback** - Works similarly to the positive feedback, however the delayed signal is subtracted from the feedback loop input proportionally to the value of the **Feedback** parameter. The higher the value of this parameter, the longer the sound will take to fade.
- **Freeze** - This button works in monostable mode; when pressed, it momentarily sets the **Feedback** value to **100%**. If the **Feedback** value is positive, then it is set to **+100%**. If the **Feedback** value is negative, then it is set to **-100%**.

## Stereo spread

This parameter is located in the **Loop Delay** section; it sets a phase shift between **L** and **R** channels (*Left* and *Right* channels) or **M** and **S** channels (*Mid* and *Side* channels).

This parameter may have the following values:

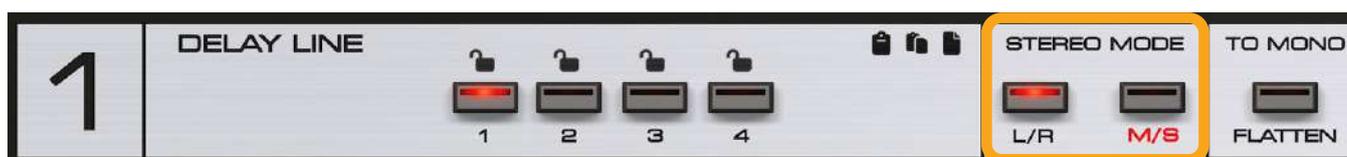
- **C (Center)** - The center value is neutral, meaning there is no phase shift.
- **L (Left)** - Moving this parameter left will increase the phase shift between channels (**Stereo; L/R**), and channel **L** will precede channel **R**. Moving the dial all the way left will result in a phase transition between channels that is half the time of the feedback loop delay.
- **R (Right)** - Moving this parameter right will increase the phase shift between channels (**Stereo; L/R**), and channel **R** will precede channel **L**. Moving the dial all the way right will result in a phase transition between channels that is half the time of the feedback loop delay.

In **M/S** (*Mid / Side*) mode, **S** (*Side*) replaces the right-side value, and **M** (*Mid*) replaces the left-side value. In **M/S** mode, **Spread** works the same way as **L/R**, but the phase delay is now between **Mid** and **Side**.

## Processing in L/R, M/S and mono modes

### Stereo mode

By default, every delay line in **Sigmund 2** processes the stereo signal in **L/R** (*Left* and *Right* channel) mode; therefore, by setting delays (**Pre Delay**, **Loop Delay**) or by moving channels toward each other (stereo **Spread**), the operations are performed in the **L/R** domain. **Sigmund 2** also allows you to process the signal in the **M/S** (*Mid* and *Side* channels) domain. In this case, delays (**Pre Delay**, **Loop Delay**) are set for **M** and **S** channels instead of **L** and **R** and the same applies to the stereo **Spread** of channels in the feedback loop. You can select **L/R** or **M/S** mode for each delay line independently using **Stereo Mode** buttons:



The Stereo Mode section

- **L/R** - The **Delay Line** works in *Left + Right* stereo channel mode
- **M/S** - The **Delay Line** works in *Mid + Side* stereo channel mode

## Stereo cross fade

Additionally, by using the **Ch. Cross Fade** knob, channels can be swapped with each other (**L** with **R** or **M** with **S**, depending on the value of **Stereo Mode**).



The Ch. Cross Fade parameter

The knob controls signal crosstalk control between stereo channels, depending on the stereo mode (**L/R** or **M/S**). The parameter works as a double crossfader:



A diagram showing the full value range of the Ch. Cross Fade

## Mono mode

The **To Mono** button is used to monophonize the **Delay Line's** input signal.



The To Mono button

The button works in toggle mode; pressing the button activates the option, pressing it again deactivates it. The operation consists of summing the input signal from the *Left* and *Right* channels into a single signal.

## Remarks

Operations described in this subsection are performed at the beginning of the **Delay Line** in the following order:

1. Monophonizing (optional)
2. Choosing the processing mode (**L/R** or **M/S**)
3. Cross fading stereo channels (Between **L** and **R** or **M** and **S**, depending on the chosen **Stereo Mode**)

Therefore, when **To Mono** mode is activated and the channel swap option is used (**Ch. Cross Fade**) with **M/S** mode on, the output will not contain the **M** component, only the **S** component, regardless of the input signal (*Stereo* or *Mono*).

## Modulation

In **Sigmund 2**, there are four general purpose **Modulators** available. These **Modulators** are not independent for every **Delay Line**, but work as global generators to modify parameters across the entire plug-in instance:



The Modulators section

The **Modulators** can be used to modulate a few of the **Delay Lines'** parameters:

- **Filter Modulation** - Cutoff frequency of a **Delay Line's** filters
- **Volume Modulation** - A **Delay Line's** output **Volume**
- **Delay Time Modulation** - **Delay Time** in the feedback loop

The range of influence, or **Modulation Amounts**, are defined separately for each **Delay Line**.

The bottom part of a **Delay Line's** parameters occupy three subsections consisting of four **Modulation Amount** knobs each:



The Modulation Amount knobs

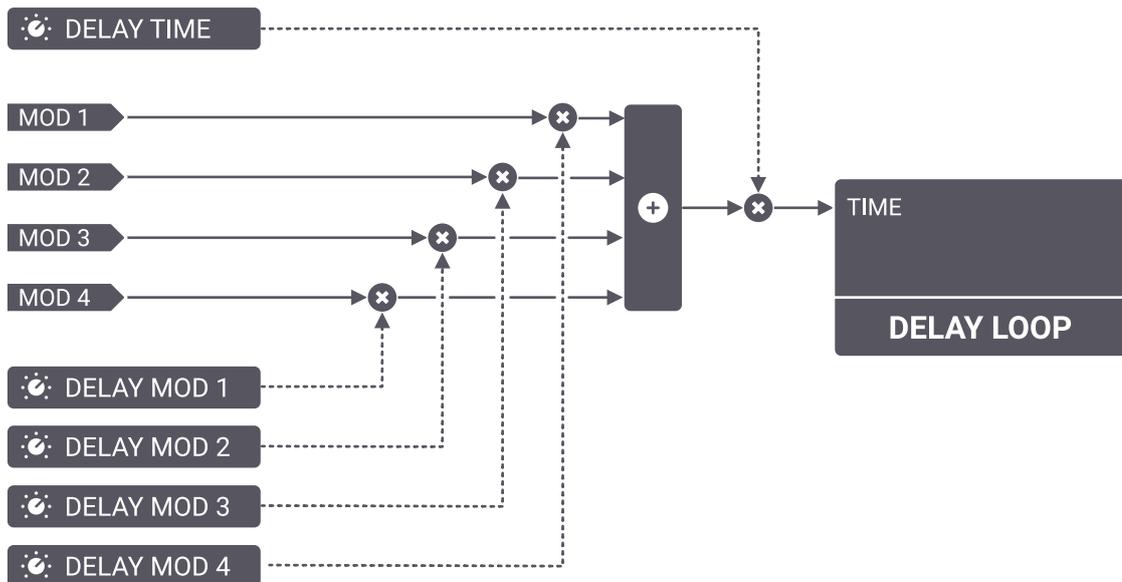
Which means that each of the four **Modulators** affect each **Delay Line's** **Cutoff**, **Delay Time** and **Volume** independently.

### Delay time modulation



The Delay Time modulation subsection

Amount knobs in the **Delay Time Modulation** subsection define the range of influence for the **Modulators** on the delay value in the feedback loop.



A diagram showing the delay time modulation routing

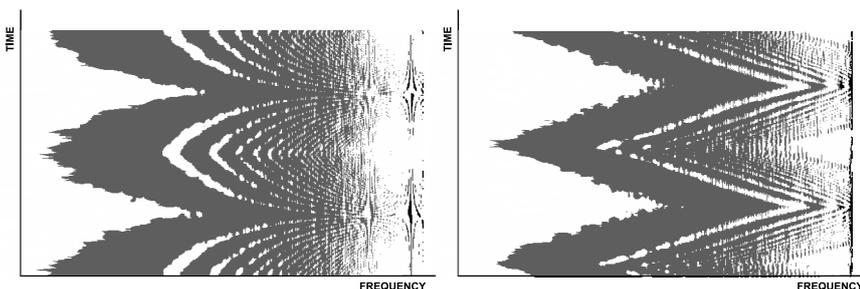
### Time scale

Additionally, the **Delay Time Modulation** subsection includes the **Time Scale** toggle button:



Which allows you to choose a scale / domain according to which the **Modulators** influence the delay time:

- **Disabled** - Linear scale
- **Enabled** - Logarithmic scale



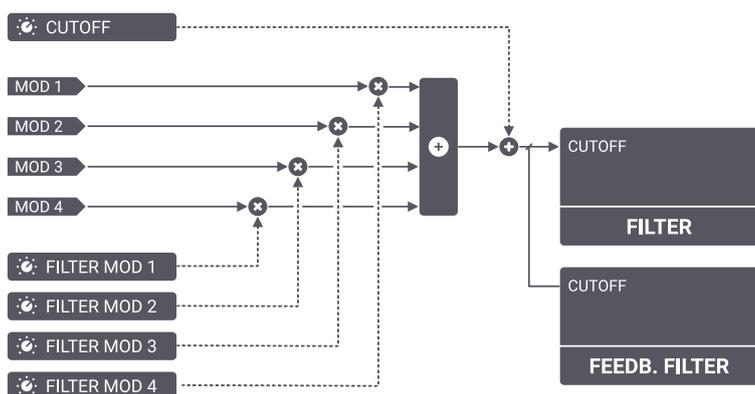
Two graphs showing the influence of linear scale (on the left), and logarithmic scale (on the right) on an LFO. Linear and logarithmic options change the wave shape of LFO output. (Spectrogram is scaled logarithmically)

## Filter modulation



The Filter Modulation subsection

**Amount** knobs in the **Filter Modulation** subsection control **Cutoff** frequency modulation of both the **Multimode Resonant Filter** and the **Passive Filter** in the feedback loop.

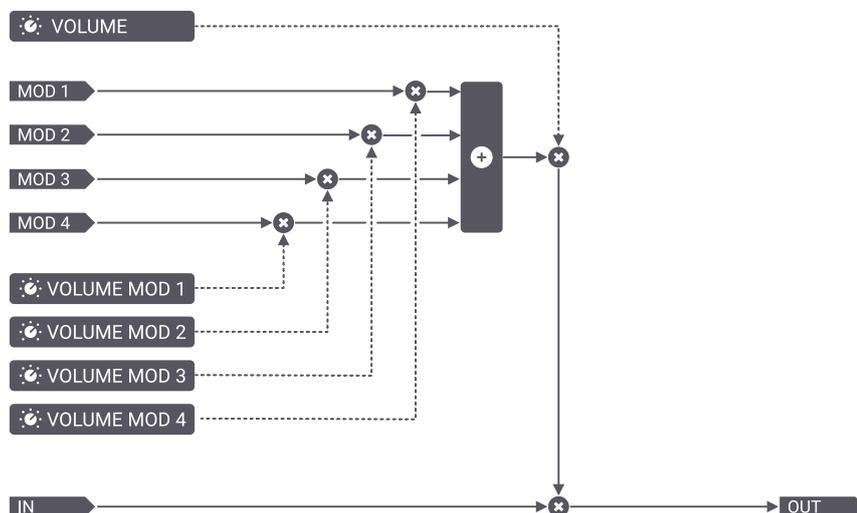


A block diagram showing cutoff frequency modulation routing

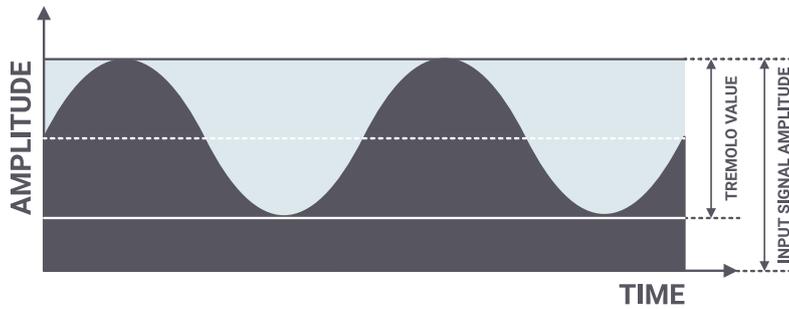
## Volume modulation



**Amount** knobs in the **Volume Modulation** subsection control the range of influence of the **Modulators** on the output of the **Delay Line's** amplitude. The higher the value of the amount knobs, the closer the minimum of the generated **Modulators'** oscillations comes to the minimum of the modulated signal:



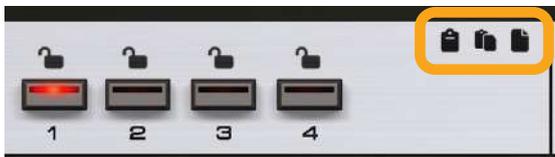
A block diagram of amplitude modulation - Tremolo effect



A diagram showing the amount knobs' influence on the depth of amplitude modulation by LFO type modulator

## Copy / paste / initialize

Using icons in the **Delay Line's** header, you can copy the settings of one delay line onto another or restore it to its initial values.



The Copy / Paste / Init functions for a Delay Line

Starting from the left:

- **Copy** - Copies the current **Delay Line** parameter values to the buffer.
- **Paste** - Pastes the buffer onto a selected **Delay Line**, overwriting the parameter values.
- **Initialize** - Restores initial parameter values for a selected **Delay Line**.

## Modulators

There are four **Modulators** available in **Sigmund 2**. These are general purpose **Modulators** that can be used to modulate some of the **Delay Lines'** parameters (**Amplitude**, the Filter's **Cutoff** and **Delay Time** in feedback loop).



The Modulator section

Each **Modulator** has one of three types:

- **LFO** - Low Frequency Oscillator
- **ENV** - Envelope
- **PEAK** - Peak follower

The **Modulator Type** can be selected by the combo box in the top part of the modulator tab:



*Modulator Type*

## LFO

An **LFO** can work in synchronization with the host application's tempo or independently, depending on the **Sync** button status. By default, it works without synchronization. Switching on the **Sync** parameter makes a slight change to the view of the **LFO** section on the GUI because not all of the **LFO's** parameters are common for both modes.

### Non-synchronized LFO

With **Sync** option inactive, the following parameters are available in the **Modulator** section of the GUI:



*An LFO in non-synced mode*

- **Rate** - Sets the frequency of the generated oscillations. The LED above the **Rate** label flashes in time with the **LFO's** oscillation frequency.
- **Wave** - Selects the oscillator's waveform.
- **Invert** - Reverses the phase of oscillations.
- **Phase** - The **LFO** generates waveforms independently for both stereo channels. The phase parameter controls the phase shift between channels (*Left and Right* or *Mid and Side*, depending on the selected delay line **Stereo Mode**). This parameter ranges from *0* to *180 degrees*, in which *0* means a lack of phase shift (both channels have an identical waveform) and *180 degrees* means the stereo signal is generated in counterphase.
- **Smooth** - Smooths jagged waveforms (**Triangle**, **S/H**, **Square** and **Sawtooth**). The greater the value, the smoother the oscillation.

## Tempo synchronized LFO

LFO synchronization with the host application tempo is activated with the **Sync** button.



The LFO's Sync button

With **Sync** mode active, the oscillation frequency **Rate** is defined in tempo-dependent rhythmic / note values (ranging from 32 to 1/32). Otherwise, the oscillation frequency is defined in **Hz** (ranging from 0.01 Hz to 40 Hz).

When **Sync** mode is active, the **Rate** control changes slightly:



The Rate parameter for an LFO in Sync mode

The knob is replaced by a display with two sections. The upper one selects the note value (1/32 note to 32 bars). The lower one is a rhythmic modifier:

- **Full** - The rhythmical value remains unaltered (in accordance with the **Note** value above).
- **Dotted** - The rhythmical value is increased to 1.5 times the **Note** value.
- **Triplet** - The rhythmical value constitutes 1/3 of the **Note** value.

## LFO Re-trigger

Regardless of whether the **Sync** mode is active or not, the **LFO** phase can be reset, either externally by a **MIDI Note** or internally by input-signal **Transients** (for detailed information refer to the **Modulator Re-triggering** section).

The moment that **LFO** phase is reset is indicated by the **Re-trigger** LED below the **Modulator** tab:



The Modulator Re-trigger LED

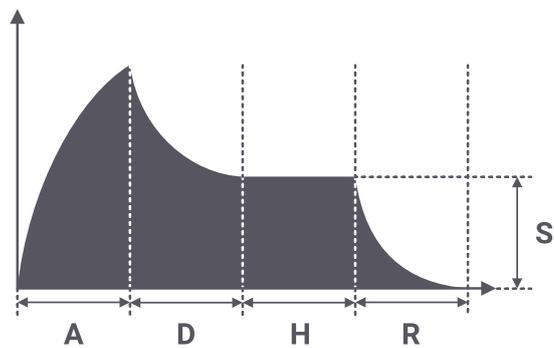
## Envelope



The Envelope type Modulator

The **Envelope** generator is another available **Modulator** type in **Sigmund**, controlled with the following set of parameters:

- **Attack** time
- **Decay** time
- **Sustain** level
- **Hold** time
- **Release** time



A diagram showing the effect of the Attack, Decay, Hold, Release and Sustain parameters for the Envelope modulator in Sigmund

### Envelope re-trigger

The **Envelope** must be triggered with a **MIDI Note** or input-signal **Transients** (for detailed information refer to **Modulator re-triggering** section).

The LED above the **Re-trigger** label indicates the moment of triggering.



The Modulator's Re-trigger LED

## Peak follower



The Peak Follower modulator

The last type of **Modulator** is the **Peak Follower**, which traces the input signal's amplitude envelope by following the momentary maxima of the signal. The delineated envelope can be used to modulate **Delay Line** parameters.

The **Peak Follower** is controlled by the following parameters:

- **Attack** - Controls the rising slope of the envelope that modulates the desired parameter.
- **Release** - Controls the falling slope of the envelope that modulates the desired parameter.
- **Sensitivity** - Sets the signal amplification before it enters the **Peak Meter** detector.

## Modulator re-triggering

Each of the four available **Modulators** can be (re-)triggered by one of the following events:

- The occurrence of a **MIDI Note** with a specific pitch on a chosen **MIDI Channel**.
- A **Transient** detected in the input signal.

Re-triggering is available for all types of **Modulator** except the **Peak Follower**:

- The **Envelope** is triggered when an event occurs.
- The **LFO** has its phase reset when an event occurs.

The **Re-trigger Mode** and its parameters are configured in the **Modulator** itself (independently for each **Modulator**).

Selecting an event from the **Re-trigger** combo box reveals its parameters:



**Re-trigger Mode** defines the event type:

- **Off** - (Re-)triggering is inactive
- **MIDI** - The triggering event is a **MIDI Note**
- **Transient** - The triggering event is a transient in the input signal

Depending on the selected event type, parameter values that decide the conditions of occurrence become available in the space below the combo box.

## MIDI note mode

When **MIDI** is set as the **Re-trigger Mode**, the following parameters are available:



Using a MIDI Note in Re-trigger Mode

- **Channel** - Chooses which **MIDI Channel** to listen to for a **MIDI Note: 1-16**. Choose **All** if you'd like **MIDI Notes** on any channel to trigger the event.
- **Filter** - Enables / disables **MIDI Note** filtering. If **Filter** is **Disabled** then a **MIDI Note** of any pitch will trigger the event. When **Enabled**, you can specify a particular **MIDI Note Pitch** to act as trigger.
- **Note** - Selects which **MIDI Note** pitch will trigger the event. Drag the cursor up and down over the display to change its value. This control works only when **Filter** is **Enabled**.
- **Learn** - Activates the **Learn** mode, to quickly set the **MIDI Note Pitch** using a connected MIDI keyboard. This control works only when **Filter** is **Enabled**.

## Transient mode

With **Transient** mode selected, the following parameters are available:



Using a Transient in Re-trigger Mode

- **Speed** - The rate at which the envelope of the input signal is followed.
- **Detection thresholds (Low and High)** - These set the conditions to register a transient; a transient registers once it has passed the upper threshold (**High** threshold), but only if it has earlier passed through the lower threshold (**Low** threshold). A transient is an occurrence of a rapid rising slope in the input signal's envelope. Below the knobs, you can find the threshold parameter meter; on this, a dark horizontal line represents the temporary value of the envelope, offering visual feedback, which helps you comfortably set threshold values.

## Copying / pasting modulator parameters

Using icons in the **Modulators**' header you can copy the settings of one **Modulator** onto another.



*Copying / pasting Modulator parameters*

Starting from the left:

- **Copy** - Copies the current **Modulator's** parameter values to the buffer.
- **Paste** - Pastes the buffer onto a selected **Modulator**, overwriting its previous parameter values.

## Delay lines mixer

On the right side of the **Delay Line** and **Modulator** section, you can find the **Mixer** section; this controls the output volume or panning of each **Delay Line**.



*The Mixer section*

The first row consists of **Mute** and **Solo** buttons, which are used for immediate muting of delay lines. The current state of the button is indicated by its backlight.



*The Mute / Solo buttons*

The next row consists of knobs that control the **Panning** value of each line.



*The Panning settings for each Delay Line*

The next row consists of VU-meters, which indicate the signal level on the output of each line.



*VU-meters that measure output signal levels on each line*

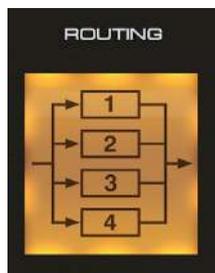
The last row in the **Mixer** section consists of faders controlling the signal volume on the **Delay Lines'** outputs.



*Faders controlling output signal levels on each line*

# Routing

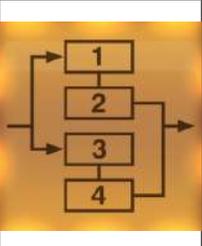
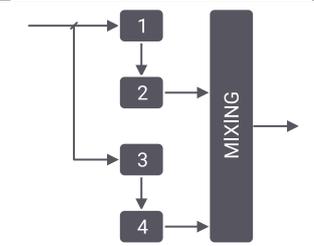
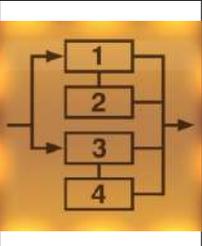
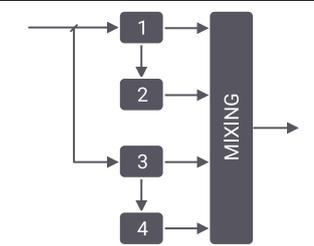
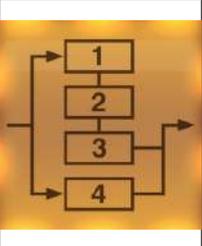
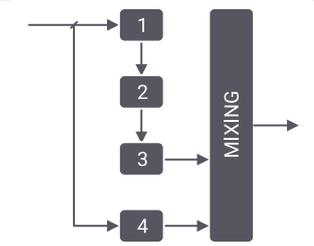
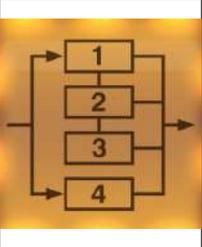
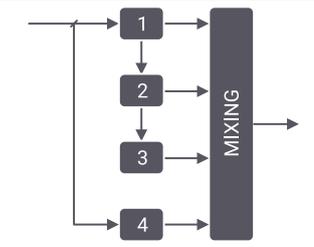
In Sigmund, Delay Lines can be connected in several different manners / topologies. The **Routing** display shows the current configuration for the delay lines.



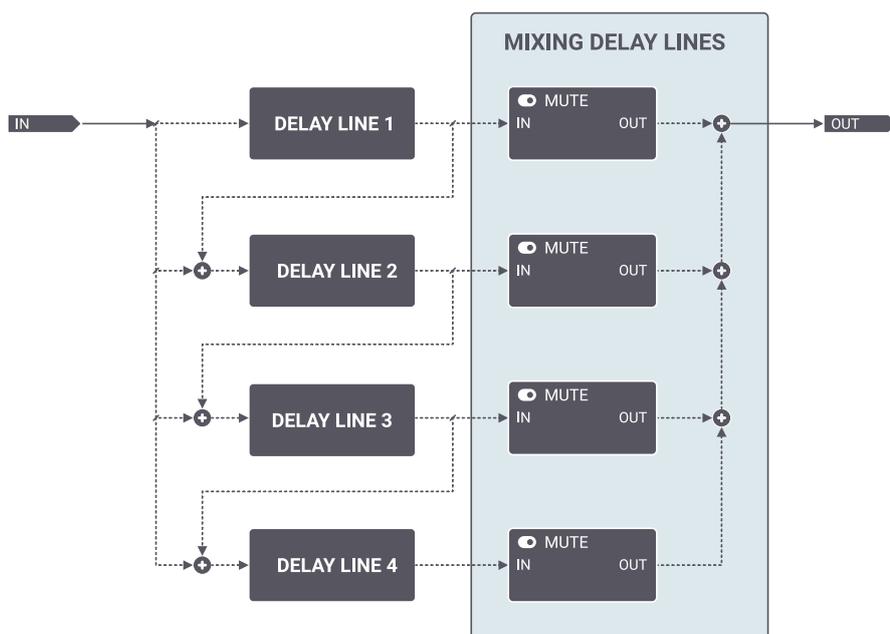
The Routing display

Clicking the display opens a combo box showing the nine different routing configurations:

	GUI Symbol	Name	Diagram	Description
1		Parallel		Parallel line connection (default). The input signal is provided to all four delay lines. Each line processes it independently and afterwards the line outputs are mixed together.
2		Serial		Serial connection. The input signal is processed in a cascade manner by all delay lines and afterwards passed onto the output.
3		Tapped serial		Tapped serial connection. The signal is processed in a cascade manner, as in the previous configuration, but every line, besides passing its output onto the input of the next line, also sends the signal to the mixer.
4		Mixed 1		Serial-parallel connection. The first two lines work in a cascade manner, in which the output of the second line is sent to the mixer, while lines three and four work in parallel mode and their outputs are passed to the mixer.
5		Mixed 2		Tapped serial-parallel connection. The configuration is almost the same as the previous one but with one difference, line one's signal is tapped. So, apart from creating a cascade with line two, line one also passes the signal on to the mixer.

6		Mixed 3		<p>Semi-parallel connection (with two cascades). Lines one and two form a cascade, and lines three and four form a second one. Both cascades are processed parallel.</p>
7		Mixed 4		<p>Tapped semi-parallel connection (with two cascades). Similar to the previous configuration, there are two cascades, but the difference is that lines one and three are tapped and send their output to the mixer.</p>
8		Mixed 5		<p>Semi-parallel connection (with one cascade). Lines one, two and three are serially connected to form a cascade, which works in parallel to line four.</p>
9		Mixed 6		<p>Tapped semi-parallel connection (with one cascade). Similar to no. 8, but the difference is that lines one and two are tapped and send their output to the mixer.</p>

Note that in any **Topology** where the signal is cascaded (passed from one **Delay Line** to another) and tapped (also passed directly to the **Mixer**), the **Mute** button will only mute the tap to the **Mixer** but not the cascade to the other **Delay Line**.



A block diagram showing Mute button functions in the Mixer environment

The above picture represents all potential connections between **Delay Lines** in **Sigmund**. As depicted, the taps are situated after the line output and before the **Mute** switch; therefore, using **Mute** will not interrupt the signal flow from one line to another when they work in a cascade manner.

## The master section

In the **Master** section, the final touch is applied to the signal that was summed in the **Mixer** section.



*The Master section*

The **Master** section contains the following elements:

### Limiter

A **Limiter** with an automatic release.



*The Limiter subsection*

This section has the following controls:

- **Limiter** - Turns the **Limiter** on or off.
- **Threshold** - Regulates the range of output signal dynamics. Input signal dynamics are reduced to the selected value, and then make-up gain is applied.

The **FX** parameter sets the ratio between wet and dry signals before passing it to the output.



*The FX fader*

### Output volume

The **Output Volume** parameter controls the output signal level.



*The Output Volume knob*

## The padlocks system

**Padlocks** is a functionality that prevents specific parameters from changing their value when loading or reloading presets. Preventing overwrite is possible for specific **Delay Lines** (in the **Delay Line** parameters section) and/or values of the **FX** parameter (the ratio between **Dry** and **Wet** signal). Click the padlock icon to prevent overwrite of a group of parameters. This works similarly to buttons in toggle mode: one click prevents overwrite of a group of parameters and a second click allows overwrite again.

### Preventing overwrite of delay line parameters

Preventing overwrite of **Delay Line** parameters is achieved by using the padlocks situated above the **Delay Line** selector in the **Delay Line** header.



*The Delay Line padlocks*

To prevent overwrite of parameters for a specific delay line, simply click the padlock over the number corresponding to that particular line.

Each padlock relates to the parameter values of a single delay line.

### Preventing overwrite of the FX parameter

The padlock responsible for preventing overwrite of the **FX** parameter is situated directly above it:



*The FX padlock*

One click on the padlock is sufficient to prevent the parameter from having its value overwritten while loading a preset.

## Options

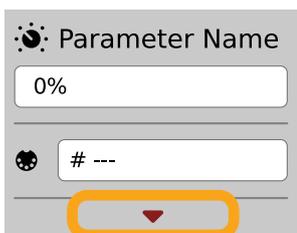
This chapter concerns all the additional plug-in settings that aren't stored with any preset type. These settings are exclusively stored within a DAW session but can also be saved and loaded using the options described later in this chapter.

## MIDI

This chapter describes everything about communication between the DAW (host) and the plug-in regarding MIDI.

### *MIDI learn*

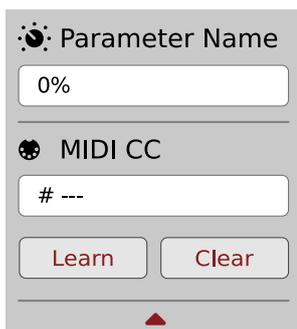
Right-click any plug-in parameter to open the context menu:



*A context menu*

Left-clicking outside the menu area closes it automatically.

Clicking the bottom arrow expands the menu and displays all available options:

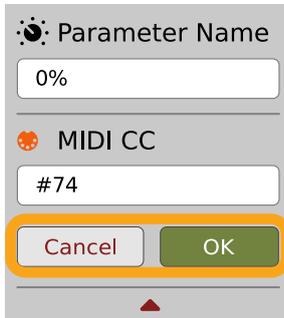


*An expanded context menu*

## Linking a parameter to MIDI CC

The **Learn** function enables a quick assignment of physical controllers (from a MIDI controller) to plug-in parameters.

1. Click the **Learn** button to put the plug-in into a pending state before moving any MIDI CC controller.
2. Once the CC is recognized, click **OK** to save the change or click the **Cancel** button to restore the previous setting.

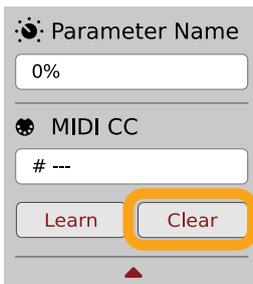


Linking a parameter to MIDI CC

## Unlinking a parameter from MIDI CC

You can also delete a MIDI CC code attributed to a parameter from the context menu:

1. From the context menu, click the **Clear** button:

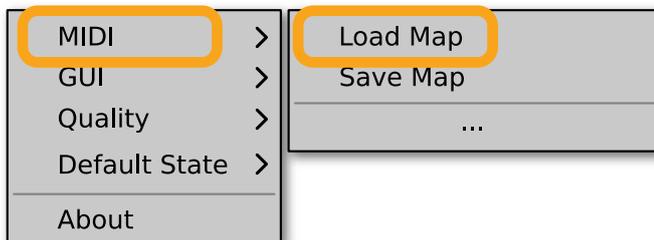


The Clear MIDI CC button

2. Then confirm using the **OK** button.

## Loading / Saving a MIDI CC Map

These options are available in the **MIDI** submenu, accessible under **Cog** icon in the left-upper corner:



The Load Map and Save Map options

- **Save Map** - Saves the current MIDI CC map to a file.
- **Load Map** - Loads a MIDI CC map from a stored file.

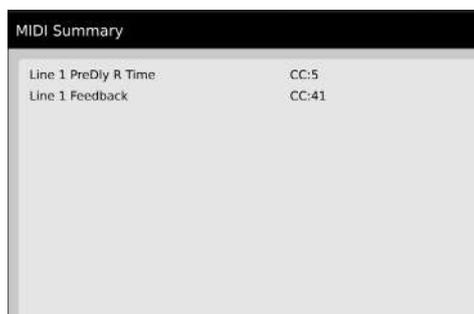
## MIDI summary

Once you have enabled some parameters for automation or assigned them (using **MIDI Learn**) to MIDI CC, you can check the current status of that assignment using **Show Map** option in **Options -> MIDI** menu:



The MIDI / Automation Summary menu option

Using this option will bring up the **MIDI Summary** window:



The MIDI Summary window

This shows the list of parameters and the MIDI **CC** numbers they are assigned to.

## GUI

The **Size** and **System Scale** options are accessible from the GUI submenu under the **Options** menu in the upper-left corner of the plug-in. With these, you can adjust the look of the plug-in to suit the pixel density and resolution of your screen, and make some tweaks to the look.



The GUI Size and look options

## Size

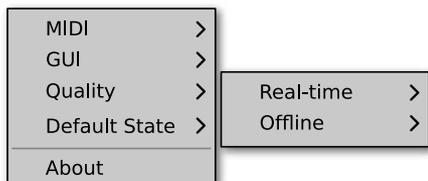
This option lets you choose one of several default skin sizes to best match the plugin to the resolution of your computer monitor.

## System Scale

**System Scale** controls the rescale factor for the whole plug-in. For the best visual results, you should set it to the exact value from your system settings (screen properties).

## Quality settings

The **Quality** submenu under **Options** button in upper-left corner allows to choose sound quality for **Real-time** or **Offline** modes.



Quality settings

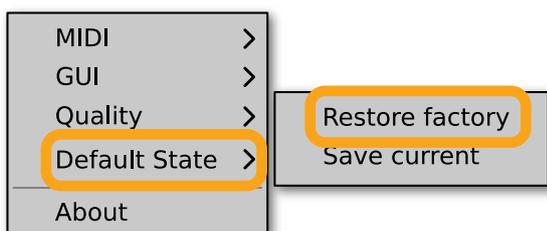
The higher the quality, the bigger the impact on the CPU.

## Default settings

You can save your current settings so that the plug-in will default to them for each new instance, or restore the plug-in to load with its factory settings.

### Changing default settings

1. Click the **Cog** icon in the left-upper corner of the plugin.
2. Go to the **Default State** submenu and choose the **Save current** option.



Changing the default state of the plug-in

With this option, the current plug-in state will be saved as the default / initial state for when you insert a new instance of the plug-in.

The plug-in state includes: sound parameters (default preset), views, preset filters, sound quality settings, loaded / created MIDI CC map and GUI settings.

### Restoring factory defaults

To return the default state for new instances to factory settings:

1. Click the **Cog** icon in the left-upper corner of the plugin.
2. Go to the **Default State** submenu and choose the **Restore factory** option.

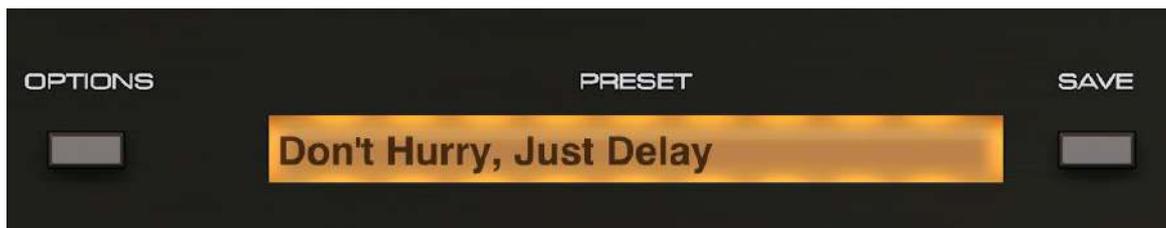
# Preset Management

## Preset storage

**Presets**, both from **Factory** content and user ones, are stored as files in proper locations on the disc. Each time a plug-in instance is loaded into a project, these locations are scanned and the presets found there are consolidated into a single linear structure (list) in the **Preset Browser**.

## Browsing presets

The **Preset management section** (no matter what kind of preset it concerns) enables quick navigation and browsing of the preset structure:



*The Preset management section*

- **PRESET** - Displays the name of the currently loaded preset. Clicking the display opens the **Preset Browser** panel, allowing you to browse factory / user presets.
- **Prev / Next** - Hovering over right side of the **Preset** display exposes the **Prev / Next** buttons:



They allow for linear browsing of the presets list (depending on currently set filters - see sections below).

- **Save**  - Saves current parameters as a new preset or allows for overwriting of the existing one (see sections below).

Right-clicking over the **Preset** display opens a context menu with two or three additional options:

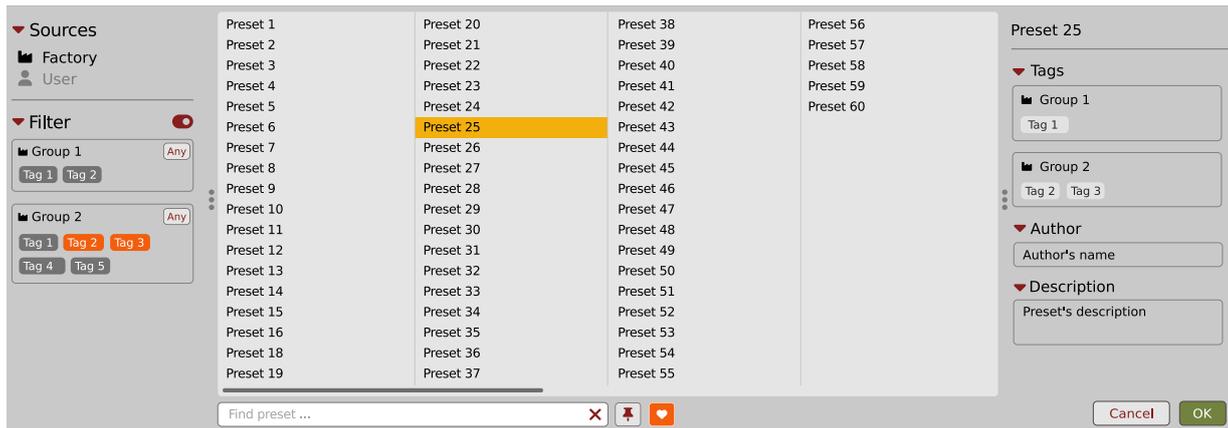
- **Init** - Restores initial settings of plug-in parameters.
- **Reload** - Reloads the most recently loaded preset.
- **Save**  - See description above.

---

 If available - For some preset types this button can be hidden and accessible from the contextual menu (accessible via right mouse-click on **Preset display**)

 If available

The **Preset Browser** looks as follows:



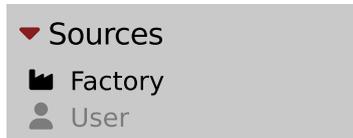
The Preset Browser

There are four main parts:

- **Sources** - Situated in the left column, filter content **Sources** for displayed presets.
- **Filter** - Below **Sources**, a preset **Filter** that uses the **Tags** system.
- **Results** - List of presets (shown in the middle column) from **Sources** that meet criteria set in the **Filter**.
- **Info pane** - The right column shows information about the currently selected preset(s), divided into several subsections.

## Sources

In this section, you can choose a **Source / Source(s)** that you want to browse presets from.



Preset Sources

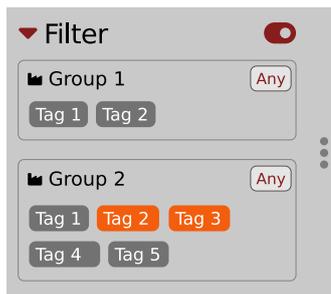
There are two resources to choose from:

- **Factory** - Delivered together with the plug-in and cannot be modified (read-only).
- **User** - Created by the user and can be freely modified or shared with other users.

Choosing any of them will cause the results to narrow to the presets from one resource.

## Filter

The section below is the **Filter**, which represents a preset filtering system using **Groups** and **Tags** to browse the content.



The Filter section

## Groups and tags

Each **Preset** is described by a few common **Groups**. Within each of them there may be one or more **Tags** from a particular set.



The Filter group

Presets from the **Factory** resource were assigned **Groups** and **Tags** when they were created.

**Groups** and **Tags** describe the content clearly, taking into account the plug-in's purpose.

Editing of the **Groups** and **Tags** for **Factory** content is limited. User presets can be described with the same **Groups** and **Tags** as **Factory** content, or you may define additional **Tags** within factory **Groups** and even create your own **Groups** with your own **Tags** to describe your own presets.

The only limitation is that a user cannot remove factory **Groups** or **Tags** from **Factory** content.

## Results

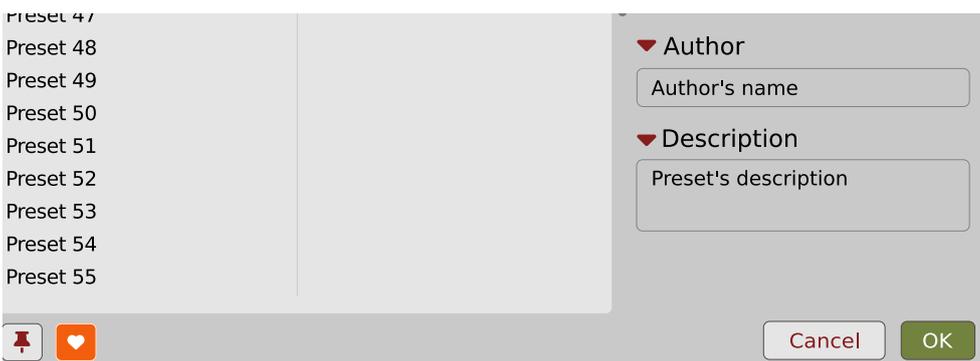
This is a list of presets from chosen **Sources** that meet the filtering criteria. The basic function of this section is to browse and load presets. It can also be used for editing, which is described later.

Preset 1	Preset 20	Preset 38	Preset 56
Preset 2	Preset 21	Preset 39	Preset 57
Preset 3	Preset 22	Preset 40	Preset 58
Preset 4	Preset 23	Preset 41	Preset 59
Preset 5	Preset 24	Preset 42	Preset 60
Preset 6	Preset 25	Preset 43	
Preset 7	Preset 26	Preset 44	
Preset 8	Preset 27	Preset 45	
Preset 9	Preset 28	Preset 46	
Preset 10	Preset 29	Preset 47	
Preset 11	Preset 30	Preset 48	
Preset 12	Preset 31	Preset 49	
Preset 13	Preset 32	Preset 50	
Preset 14	Preset 33	Preset 51	
Preset 15	Preset 34	Preset 52	
Preset 16	Preset 35	Preset 53	
Preset 18	Preset 36	Preset 54	
Preset 19	Preset 37	Preset 55	

The Results list

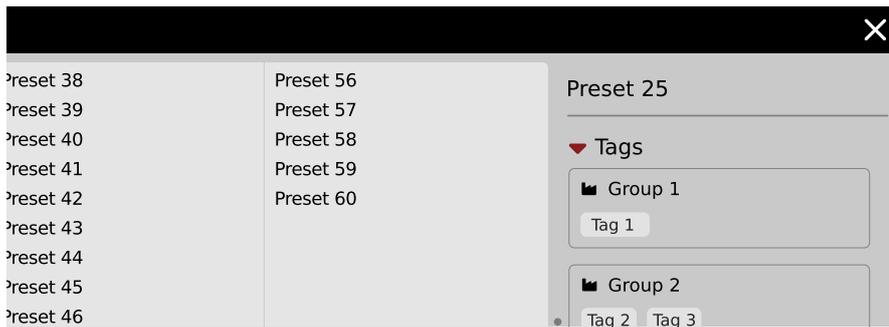
- **Click** any name to choose and load the preset.
- **Double-click** the name to choose, load the preset and close the browser.

Hitting the **OK** button confirms loading a preset and closes the browser. Using **Cancel** closes the browser but reverts all parameter changes that loading a new preset might have caused.



The OK and Cancel buttons in the browser

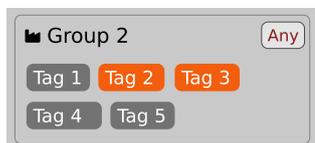
Using the **X** icon has the same effect as the **OK** button:



Close Browser window

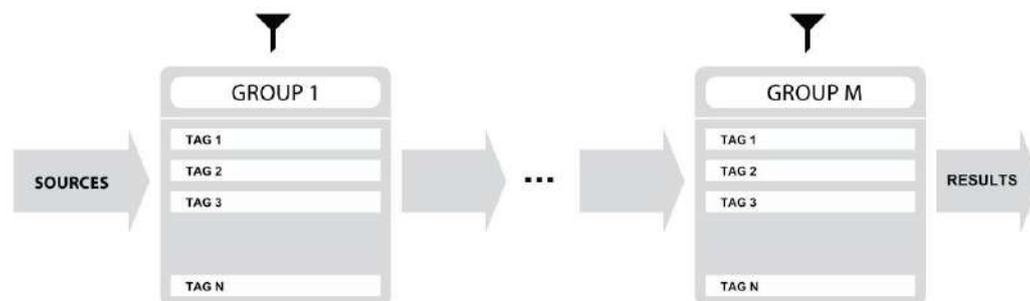
## Preset filtering using Groups and Tags

The **Filter** section contains **Groups** of **Tags**. Each Group is represented by a rectangle with the **Group** name + set of **Tags** inside.



Group 2 with two tags set (Tag 2 and Tag 3)

The filtering process cascades from top to bottom. This means that all presets available in the selected **Sources** are filtered by selected **Tags** from the first **Group** (uppermost one), then the **Group** below and so on, until filtered by the last active **Group** (the bottom one).



Preset Filtering with the use of Groups

The result of the cascade filtering process is listed in the middle column, the **Results** / presets list section. You can also consider the **Results** list as an intersection of preset sets, found by filtering through every individual **Group**.

### Basic Actions

**Tags** work as toggle buttons. Click to *activate* / *deactivate* a **Tag**; a gray background color means that the **Tag** is inactive, and orange means that the **Tag** is active.



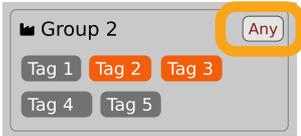
Group 2 with two tags set (Tag 2 and Tag 3)

If at least one **Tag** in a **Group** is active, then the **Group** (filter) also becomes active, otherwise the **Group** chosen doesn't affect the filtering process at all.

## Group operator

When a single **Tag** is active in a **Group**, only presets having that **Tag** set are displayed in the **Results**.

If two or more **Tags** in a **Group** are active, the **Results** depend on the **Operator** chosen for the **Group**:



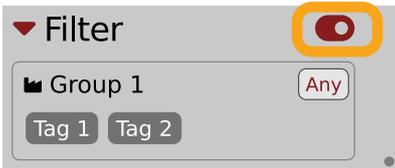
A Group operator

The **Operator** button works in toggle mode and offers a choice of two alternative **Operators** for the **Group**:

- **Any**  - Means that a preset is shown in the **Results** when the preset includes at least one of the active **Tags** from the **Group**.
- **All**  - Means that a preset is shown in the **Results** only when the preset includes all active **Tags** from the **Group**.

## Filter enable / disable

You can quickly enable / disable the **Filter** using the toggle switch in the top-most section of the **Filter**:



An On/Off switch for a Group Filter

## Other types of filtering

### Searching by name

Alternatively, you can look for a preset by entering its name or just a piece of its name into the **Find preset** field:



The Find preset input

The **Results** are refreshed on-the-fly and they work together with the other filters.

Using the **X** icon clears the entire field:



Clearing the search field

### Filtering Favorite presets

You can mark presets as a **Favorite** by clicking the **Heart** icon while hovering on preset name . You can unmark presets by clicking the icon again (toggle mode):

- 
- Logical OR between Tags in the Group
  - Logical AND between Tags in the Group
  - It's allowed for every **source** (factory or user)



Setting a preset as a Favorite on the list

The flag is stored globally, meaning that a **Favorite** preset will be accessible as such from every other instance of the plug-in  .

Once you have your **Favorite** presets flagged, you can quickly filter them using the toggle button with a **Heart** icon on it:



Favorite presets filtering

If the button is active, then only **Favorite** presets will be shown (considering all remaining filters).

### Filtering Pinned presets

You can **Pin** one or more presets using the **Pin** icon while hovering over a preset name  . You can unpin a preset by clicking the icon again (toggle mode):



Pinning a preset on the list

Unlike **Favorites**, this flag works locally and it's stored with the project file (not global config), so **Pins** are stored individually for every instance (with total recall, so a plug-in state is recalled if saved in the context of a project).

But, similarly to **Favorites**, you can easily filter presets using the toggle button with the **Pin** symbol on it:



Pinned presets filtering

If the button is active, then only **Pinned** presets will be shown (considering all remaining filters).

-  Sometimes project or plug-in reload may be required
-  It's allowed for every **source** (**factory** or **user**)

## Info panel

The column to the right shows information about the selected preset or presets. It also provides access to some of the preset editing functions.



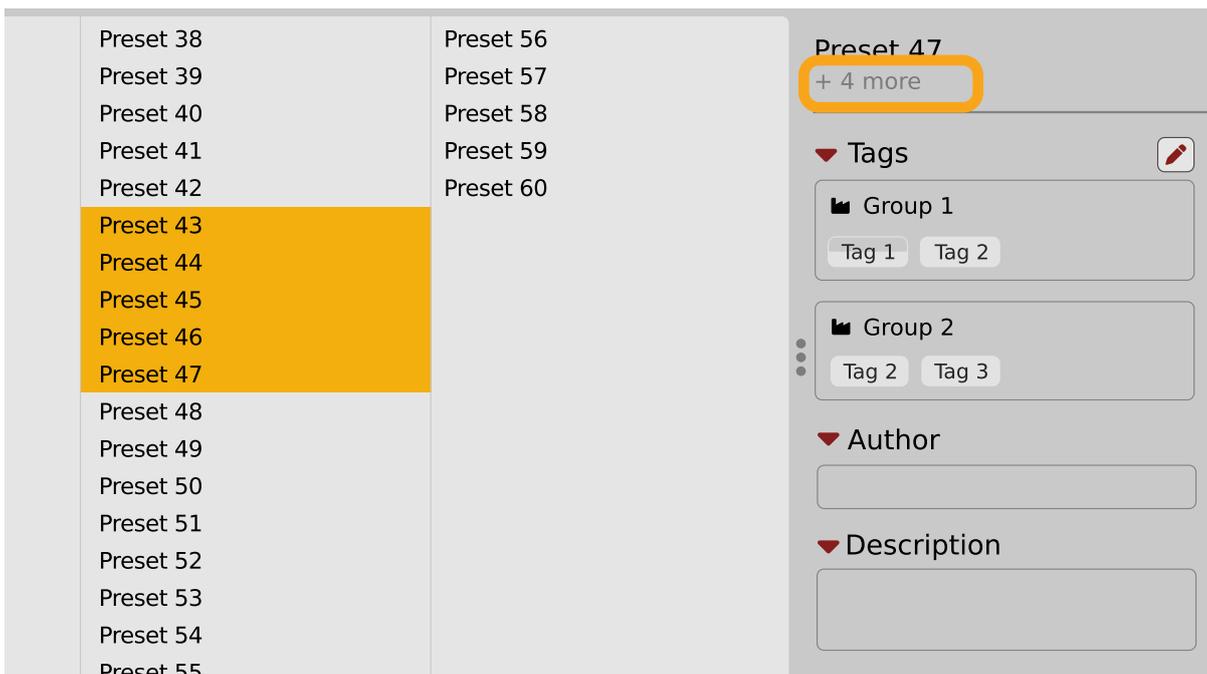
The Info pane

There's a preset name at the top.



The Preset name in the Info pane

Additionally, if you've selected more than one preset there's information about how many more have been selected:



Selecting more than one preset

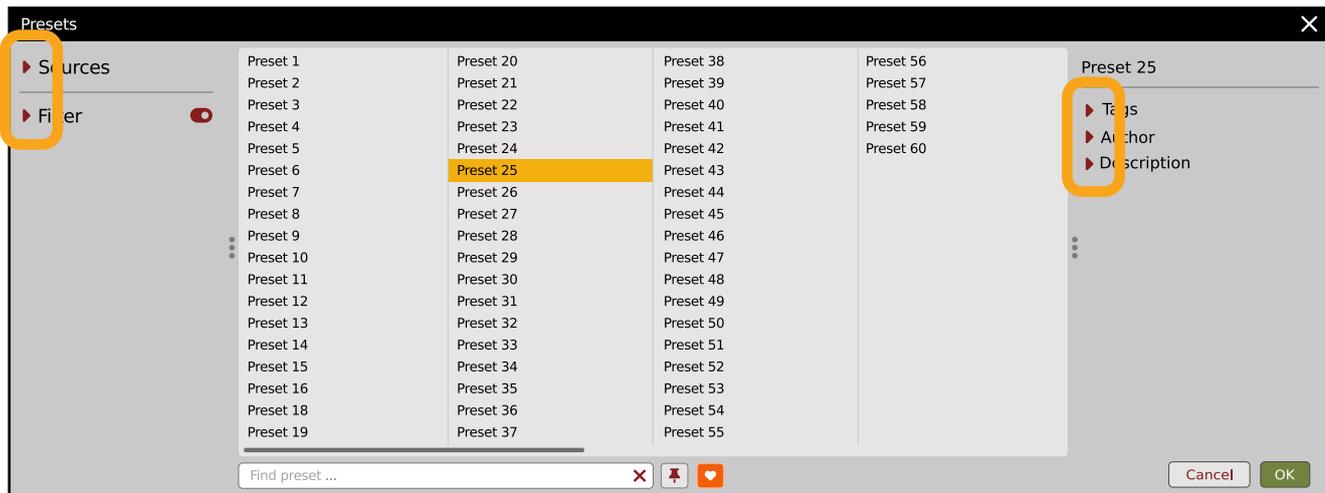
Below the preset(s) name there are few common sections describing selected presets:

- Tags
- Author
- Description

## Browser's visual adjustments

### Folding sections

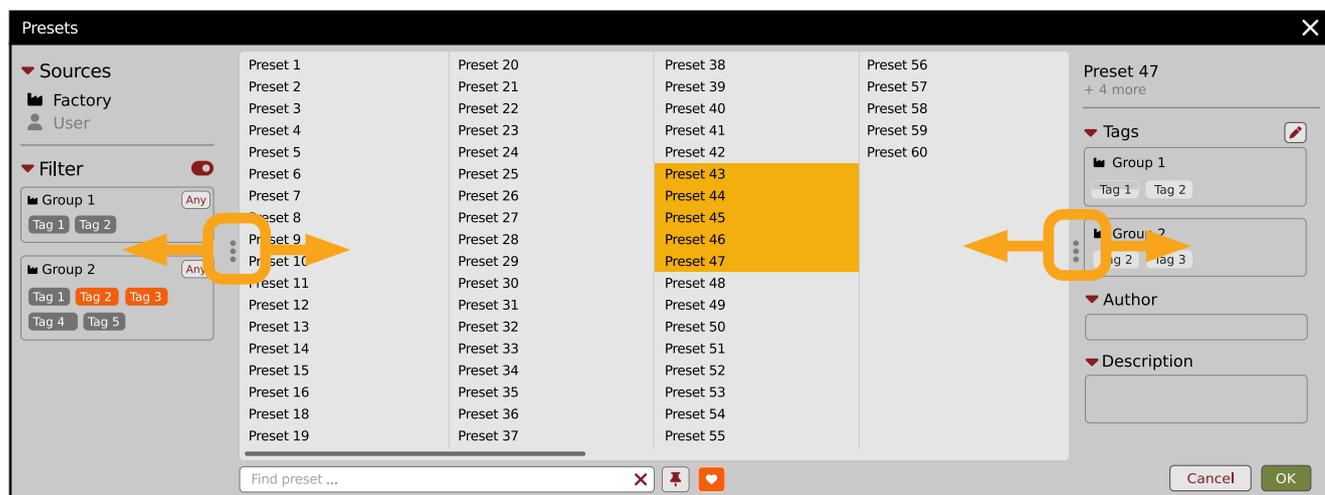
If you don't need to see the contents of every section / subsection, you can fold some of them up using the **Caret** icons:



Sections folded up

### Resizing columns

You can use the three-dotted handles to change a column's width to your preference.



Resizing Browser columns

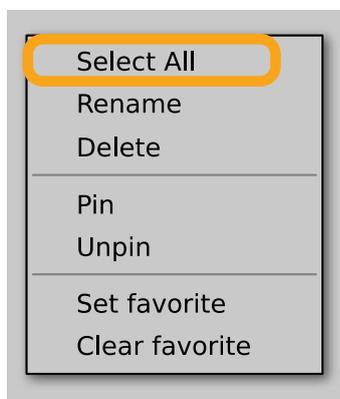
## Editing presets

You can perform certain actions on presets, such as adjusting **Groups** and **Tags**, deletion, renaming the presets as well as their export or import. One should bear in mind, however, that some operations are only allowed on user presets but not on **Factory** content.

### Preset selection for Edit

Some operations can be done on more than one preset, so you're allowed to select more than one preset at once; in the **Results** section, you can choose a preset or a set of presets in the following ways:

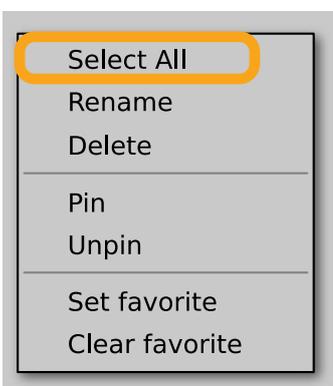
- **Click a preset** - Selects (and loads) one preset from the list.
- Win ( **Ctrl** ) + **Click the preset** ), Mac ( **Cmd** ) + **Click the preset** ) - Adds another preset to an already chosen preset or a set of presets.
- **Shift + Click the preset** - Selects a range of presets from the last chosen preset to the preset clicked with the *Shift* key.
- Right-Click on any **Preset** in the **Results** section and choose the **Select All** option - this selects all presets:



Selecting all presets

### Preset renaming

On a selected preset , right-click to open the context menu and select the **Rename** option:

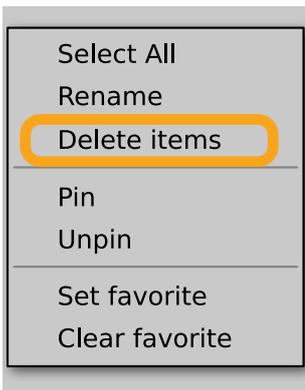


Preset renaming

▣ The option is available only for individual presets and won't work on a selection of two or more presets.

## Preset deletion

Once you have selected one or more presets, right-click to open the context menu and select the **Delete items**  option:



*Deleting presets*

Alternatively, you can use the **Trash bin** button in the **Info pane** to delete selected presets:



*The Trash bin button*

## Tags editing

When you select a preset or presets to change their tags, click the **Pencil** button next the **Tags** section in the **Info pane** to enter **Edit mode** for the **Tags**:

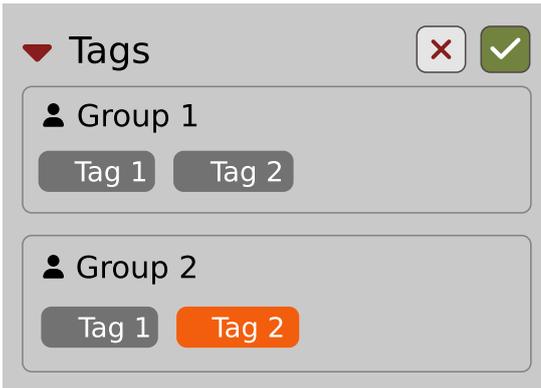


*Entering the Tag edit mode*

---

 Or **Delete** option (depending on how many presets have been selected).

With the **Edit mode** enabled, you will see all possible **Groups** and **Tags** available for the preset(s):

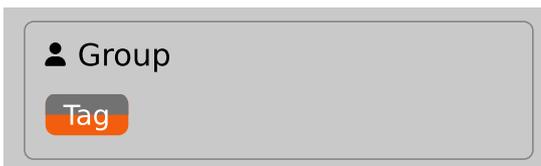


The Tag Edit mode

**Tag** buttons work in toggle mode, much like filtering. Clicking them either sets or erases a **Tag** for a chosen preset. If a **Tag** is set for a preset, it is indicated by an orange background color, whereas if a **Tag** is not set, it has a gray background color.

If you choose multiple presets with existing tags, **Tag** buttons will appear orange if a specific **Tag** appears in all selected presets, and gray if it appears in none.

When a specific **Tag** is set only for a few of the selected presets, it appears as half-gray and half-orange.



Tags appearing only in part of selection

Changing the **Tag** status for one or more chosen presets sets or erases this **Tag** in all these presets. A status change is signaled by an **Asterisk** to the left of a **Tag**.



A Tag with a status change

**Tag** buttons highlighted in half-gray and half-orange color (where **Tag** values across the highlighted presets aren't all the same) work in a three-state system when switching between states; they turn gray if you erase the **Tag** for all selected presets, orange if you set the **Tag** for all selected presets, and return to half-gray and half-orange if the selected items remain unchanged or are returned to their initial state.

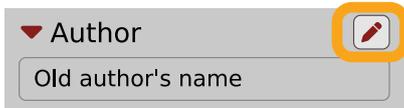
Potential changes have to be confirmed using the **OK / Cancel** buttons at the top part of the **Tags** section:



Confirmation buttons in the Tags section

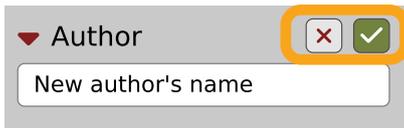
## Author editing

When you select a preset or presets to change the **Author**, click the **Pencil** button next the **Author** section in the **Info** pane to enter the **Edit mode** for the **Author** field:



*Editing Author*

Once you've finished editing the field, confirm the operation using the **OK / Cancel** buttons:

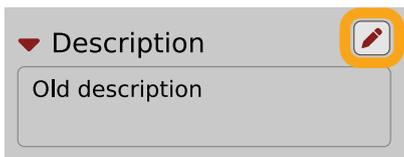


*Confirming Author editing*

This operation is possible for user content only.

## Description editing

When you select a preset or presets to change the **Description**, click the **Pencil** button next the **Description** section in the **Info** pane to enter the **Edit mode** for the **Description** field:



*Editing Description*

Once you've finished editing the field, confirm the operation using the **OK / Cancel** buttons:

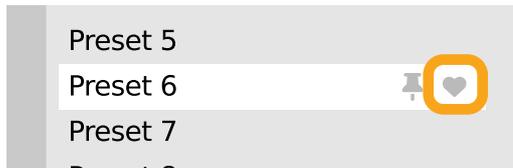


*Confirming Description editing*

This operation is possible for user content only.

## Setting presets as Favorites

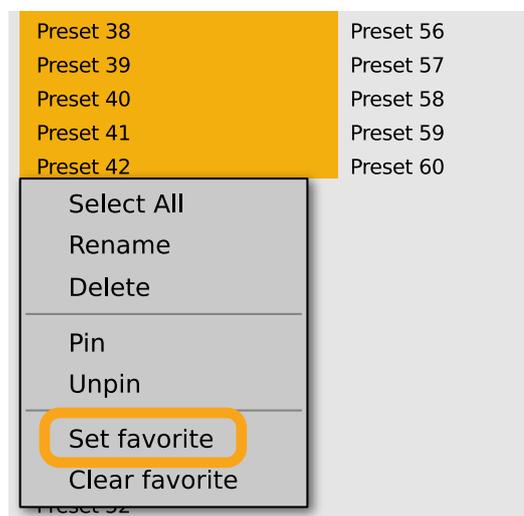
As described in the chapters above, you can mark a preset as a **Favorite** by clicking the **Heart** icon while hovering over the preset name:



Setting a preset as a Favorite

The flag is stored globally, meaning that a **Favorite** preset will be accessible as such from every other instance of the plug-in  .

It's also possible to perform the operation for a selection of presets. After you select the desired presets in the **Results** window, right-click on the presets to open a context menu:



Setting Favorite presets from the context menu

And select the **Set favorite** option.

To clear **Favorite** flags for the selection of presets, use the **Clear favorite** option instead.

## Pinning presets

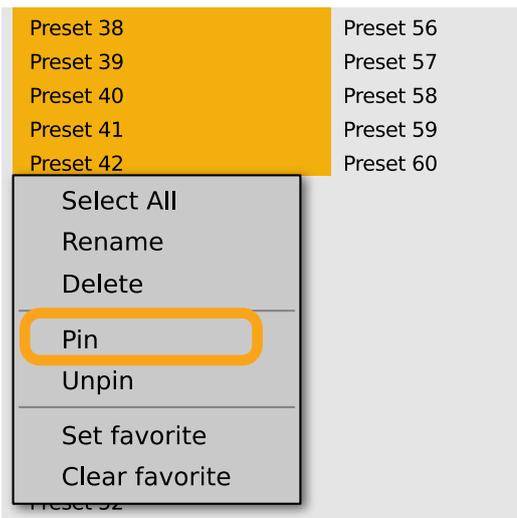
You can **Pin** one or more presets using the **Pin** icon while hovering over the preset name:



Pinning a preset

Unlike **Favorites**, this flag works locally and it's stored with the project file (not globally). This means the **Pins** are stored individually for every instance (with total recall, so a plug-in state is recalled if saved in the context of a project).

It's also possible to perform the operation for a selection of presets. After selecting the desired presets in the **Results** window, right-click on the presets list to open the context menu:



*Pinning presets from selection*

And select the **Pin** option.

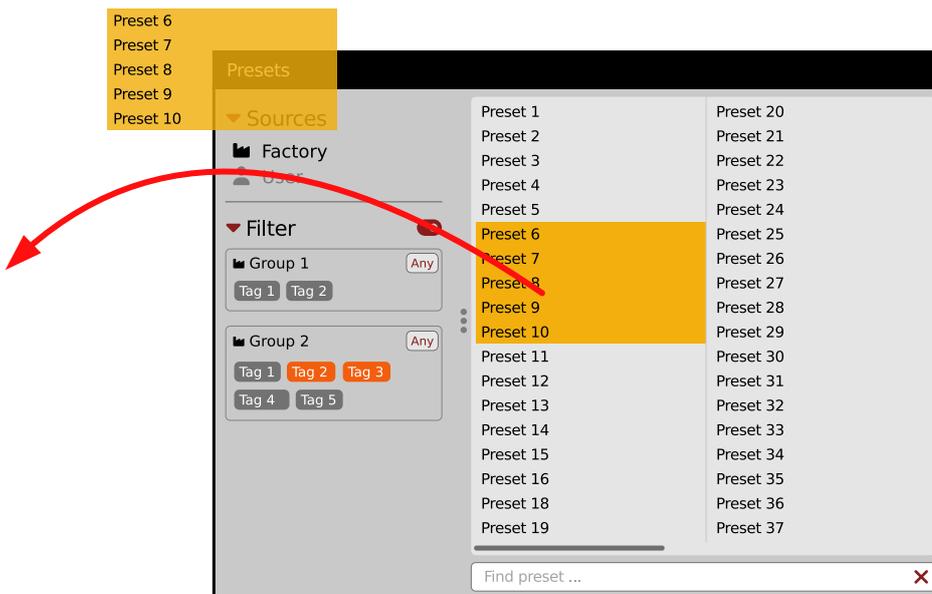
To clear the **Pin** flag for a selection of presets, use the **Unpin** option instead.

## Preset exchange

If you want to make a backup, or exchange a preset with a collaborator, you can export / import selected presets.

### Export

Select a preset or presets that you're going to export and drag-and-drop them outside your DAW into a location you'd like to store them:

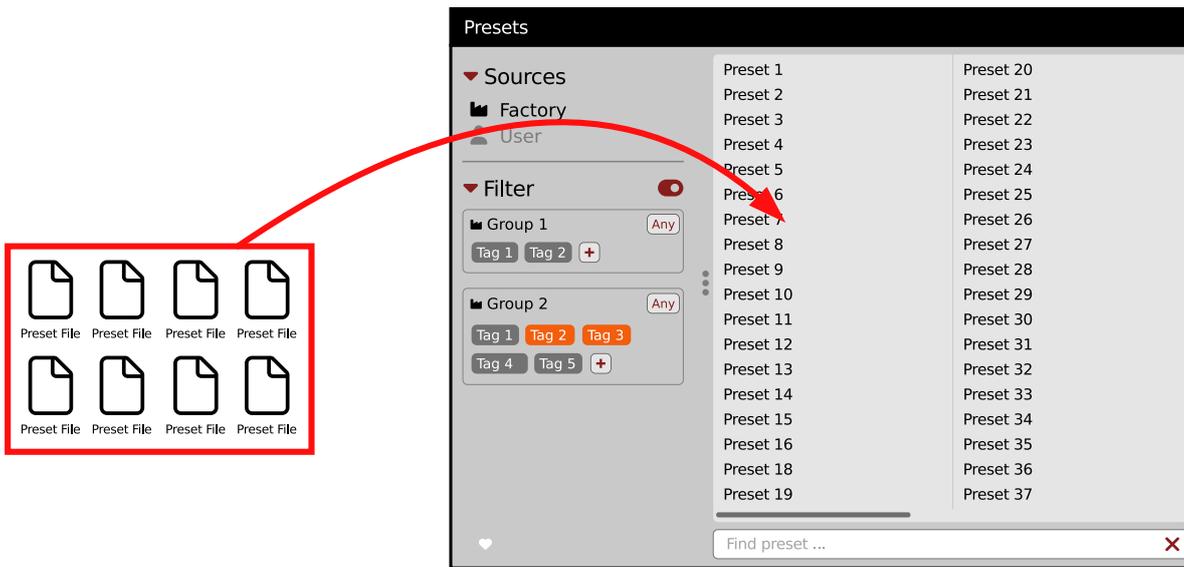


*Exporting presets*

The presets will be saved as individual files (one per preset) in the plug-in's native format.

## Import

If you'd like to import preset files, you can drag-and-drop preset files from where they're stored, into the preset browser:



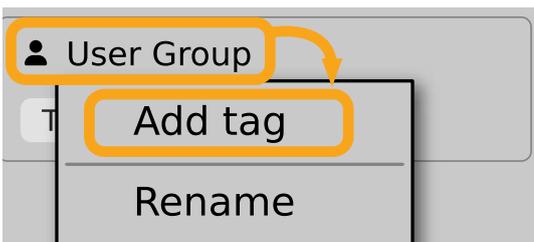
### Importing presets

They will be automatically imported as user presets.

## Creating custom Tags and Groups structure

### Adding custom Tags

Users are allowed to add their own custom **Tags** to both their own content and factory content. To add a new **Tag** to an existing filter **Group**, click over the **Group's** name to pull down a menu and select the **Add Tag** option  :

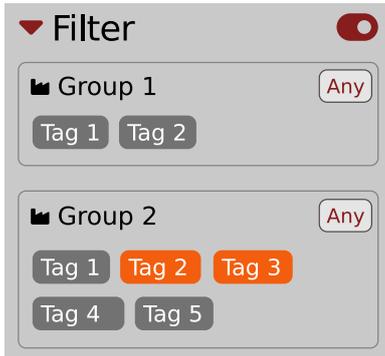


### Adding a new Tag

You can do this either in the **Info Pane** (right column, while the **Tag edit** mode is enabled) or **Filter** (left column).

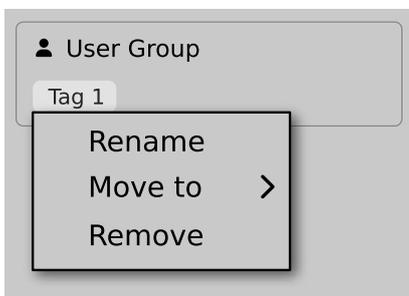
## Editing custom Tags

There are a few edit options available for a user to perform on their own **Tags**, which are available by right-clicking a **Tag's** name in the **Filter** section:



The Filter section

You will see a context menu with all the available options:



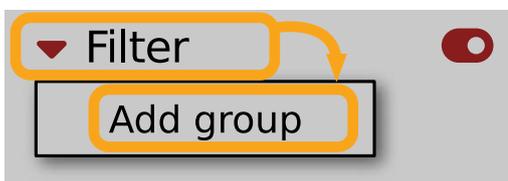
Editing options for a user Tag

- **Rename** - Changes the name of a **Tag**.
- **Move to** - Moves a **Tag** to another **Group**.
- **Remove** - Deletes a **Tag**.

The menu is accessible only for a user's own **Tags**.

## Adding custom Groups

You can add a custom filter to **Groups** by clicking the **Filter** label and selecting the **Add Group** option from the pull-down menu:



Adding a user Group

From here, you can add **Tags** to that newly created **Group** (see above), or move **Tags** from other **Groups**.

You can also add a custom filter to **Groups** in the **Info Pane** (right column) or **Filter** (left column).

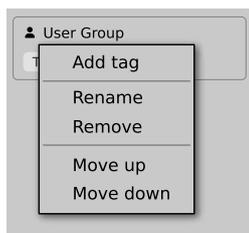
## Editing custom Groups

There are a few edit options available for a user to perform on their own **Groups**. Click on a **Group's** name in the **Filter** section:



The Filter section

You will see a context menu with the following options:



Edit options for a user Group

- **Add Tag** - Adds a new tag to the **Group** (described earlier).
- **Rename** - Changes the **Group's** name.
- **Remove** - Deletes the **Group**, possible only when all **Tags** in the **Group** have also been removed.
- **Move up** - Moves a **Group** up in the **Filter**. Possible unless the **Group** is already the topmost one.
- **Move down** - Moves a **Group** down in the **Filter**. Possible unless the **Group** is the last one.

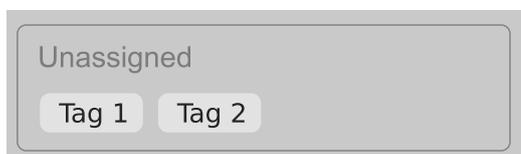
These operations are possible only on user **Groups**.

**Groups** in the **Filter** are ordered with **Groups** from **Factory** content first, then user groups below.

You can edit user **Groups** in either the **Info Pane** (right column, while **Edit mode** for **Tags** is enabled) or **Filter** (left column).

## Unassigned Tags

When you receive content from a collaborator who uses different **Tags** and **Groups**, some Tags may show as **Unassigned**. This happens if the filter structure made by a preset's author is different.



Unassigned Tags

You can move the **Tags** across your **Groups** to make them fit your scheme, or re-tag the collaborator content entirely.

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