d16 group
AUDIO SOFTWARE

SPACEREK
VIRTUAL SPACE REVERB



User Manual

19 January 2021 12:18

Requirements

Software and hardware requirements:

Windows PC

OS version	Windows 7, Windows 8, Windows 10
CPU	3.2 Ghz with SSE (System 4.0 Ghz recommended)
RAM	8 GB (16 GB Recommended)
Software	VST / AAX compatible host application (32bit or 64bit)

Mac OS X

OS version	OS X 10.7 to 10.14
CPU	Intel based 3.2 Ghz (4.0 Ghz recommended)
RAM	8 GB (16 GB Recommended)
Software	AU / VST / AAX compatible host application (64bit)

Hardware requirements and recommendations are based on estimates arrived at using the available computers at D16 Group HQ, and therefore cannot cover all possible configurations. CPU usage can vary widely, depending on how the plugin is used. Factors that may contribute to this variance include the number of simultaneous instances used, number of CPU cores available, project sample rate and selected Reverb Model.

In order to form a better understanding of how Spacerek will behave within your current setup, we highly recommend downloading the demo for evaluation.

Overview

Spacerek is a room reverb plugin built on a hybrid algorithm that combines two main architectural elements:

1. ***A virtual space simulation*** that takes into account the (adjustable) position and orientation of sources (speakers) and receivers (microphones) within the simulated space, as well as the acoustic properties of the space itself, to create the **Early** reflections.
2. ***A dynamic delay network,*** the internal parameters of which are aligned with the properties of the acoustic space defined by the **Early** reflections algorithm. This element creates the **Late** reflections.

The two elements work in tandem to provide an amazingly convincing stereo impression of a virtual space (the reverb tail), but with a lower hit on the host computer's CPU than you might expect from such a realistic acoustic simulation.

Upon loading the **Spacerek** plugin in any **VST, Audio Units** or **AAX** host application, the GUI appears:



Spacerek's graphical user interface

The interface comprises two main sections:

- **Configuration and preset management** (the top-most section)



The configuration and preset management section

- Signal processing (all other controls)

Signal flow

In this chapter, we'll describe the signal path through **Spacerek**, and explain each component and its controls along the way.

Basic modules

Each of the basic modules that make up **Spacerek** is housed within its own section in the GUI:

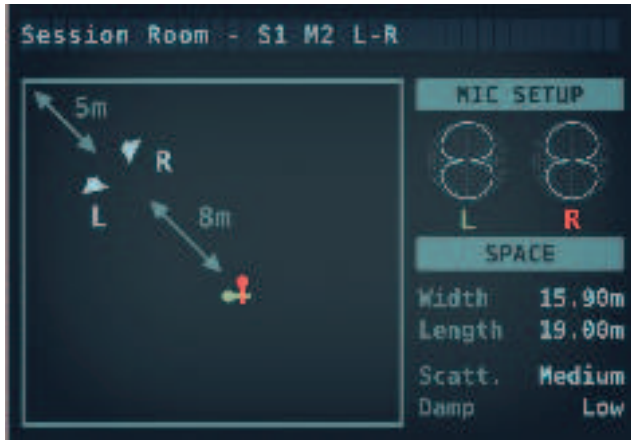
- **Reverb Model** – Select an acoustic **Room Model** from a menu of **114** options. This defines the fundamental character of the reverb.
- **Pre-delay** – Controls the initial delay added to the **Early** and/or **Late** reflections.
- **Direct / Early / Late** – Three 'mini channel strips' enable adjustment of volume level and *left/right* or *mid/side* (depending on the **Reverb Model**) balancing of the **Direct** signal, **Early** reflections and **Late** reflections before they're mixed at the output.
- **Tilt EQ** – A tilt-type equalizer applied to the reverb tail.
- **Master** – Apply a **Low Cut** filter to the signal after the **Tilt EQ**, and adjust the **Dry/Wet** mix and final **Output Volume.**

Reverb model

The **Reverb Model** defines the character of the reverb, including:

- The physical and acoustic properties of the room – dimensions, wall damping and scattering.
- The location (position) and orientation (angle) of the two left and right channel sound sources (speakers).
- The location (position) and orientation (angle) of the two left/mid and right/side channel sound receivers (microphones). The **L-R** or **M-S** channel mode is defined by the **Reverb Model.**
- Directional characteristics of both microphones.

The above characteristics and a visual representation of the currently selected model are shown in the **Reverb Model** display.



Reverb Model display

To select a different model, click the display. Alternatively you can hover with mouse pointer over the model name display to show **Prev** / **Next** buttons for fast navigation

Models are named using this convention:[**Room name**] – **S**[**Speaker setup number**] **M**[**Microphone setup number**] **L-R/M-S** (Stereo mode)

- **Room name** – Describes the room, and its physical and acoustic properties. There are multiple entries for each room in the **Reverb Model** menu, each with a different preset configuration of the following three parameters.
- **Speaker setup number** – Specifies which of the selected room's preset stereo speaker configurations (positioning and orientation) is used by the **Reverb Model.**
- **Microphone setup number** – Specifies which of the selected room's preset stereo microphone configurations (positioning and orientation) is used by the **Reverb Model.**
- **Stereo mode** – The stereo configuration of the microphone setup, either **L-R** (left/right) or **M-S** (mid/side).

By way of example, let's break down a specific **Reverb Model:**

Absorbent – S1 M2 L-R

Absorbent is the descriptive name of the **Room Model; S1** tells us that we're using the **Absorbent** Room Model's first speaker setup; **M2** specifies the **Absorbent** Room Model's second microphone setup; and the stereo configuration is **L-R** (left/right).

Pre-Delay

The **Pre-Delay** section controls the time (in *nanoseconds*, *microseconds* and *milliseconds*, up to **1** second) before commencement of the **Early** and/or **Late** reverb reflections.

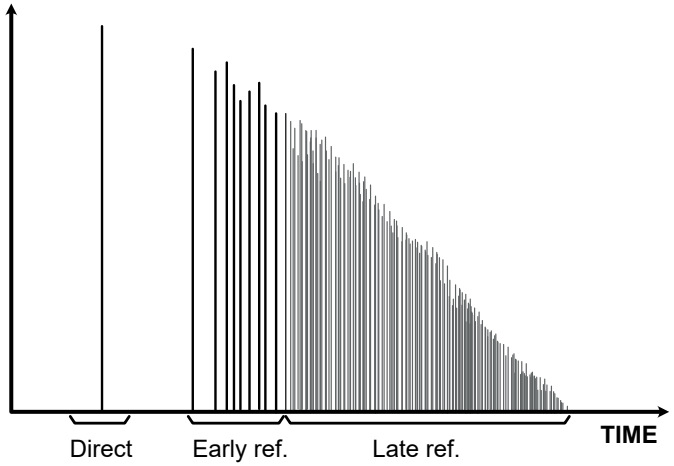


The Pre-Delay section

Direct / Early / Late

Each of these three sections corresponds to a particular component of the reverb tail.

- **Direct** – The signal that travels straight from the speakers to the microphones within the **Reverb Model**, without bouncing off the walls.
- **Early** – The early reflections; ie, the first (and loudest) reverberations to reach the microphones after bouncing off the walls.
- **Late** – The late reflections; ie, the slower second and subsequent reverberations arriving at the microphones after bouncing off the walls.



The dynamic and temporal characteristics of a room reverb divided into the Direct signal, and Early and Late reflections

The three signals are balanced and mixed in the **Direct** / **Early** / **Late** section of the GUI.



The Direct / Early / Late mixer section

- **Balance** – Controls the stereo balance between the *left/mid* and *right/side* channels. The stereo mode (**L-R** or **M-S**) is determined by the selected **Reverb Model.**
- **Volume** – Sets the output volume level from *-inf* to *+12.0dB*.

Tilt EQ

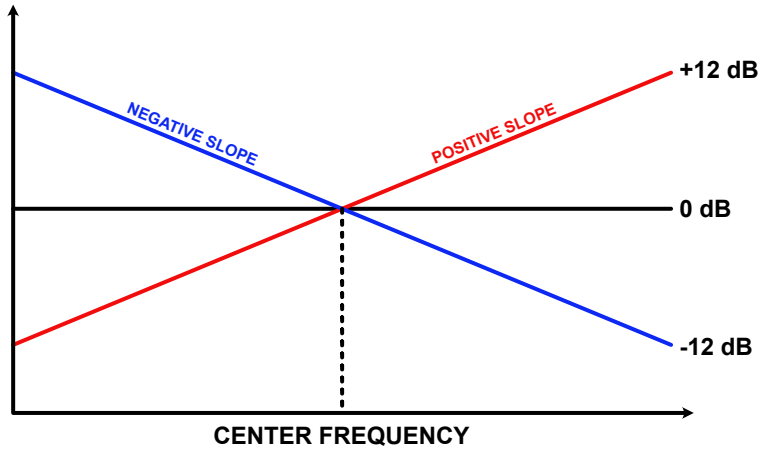
After mixing the **Direct** signal, **Early** reflections and **Late** reflections, the reverb tail can be shaped using the Tilt EQ module.



The Tilt EQ section

The Tilt EQ offers adjustment of the following parameters:

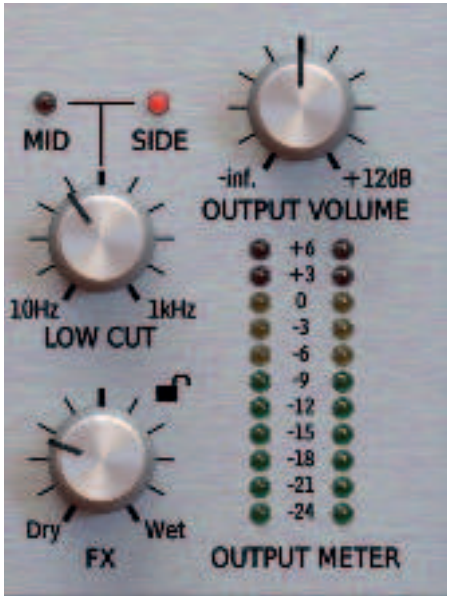
- **Tilt EQ** – Toggle the LED to enable or disable the EQ.
- **Freq** – Adjusts the center 'fulcrum' frequency on which the **Slope** tilts.
- **Slope** – Sets the frequency response by boosting or lowering the gain of the right-hand (high-frequency) end of the EQ slope, and applying the opposite amount of gain to the left-hand (low-frequency) end of the slope.



Tilt EQ frequency response

Master section

The final stage, where the **Output Volume** and **Dry/Wet** mix are set, and an optional **Low cut** filter is applied.

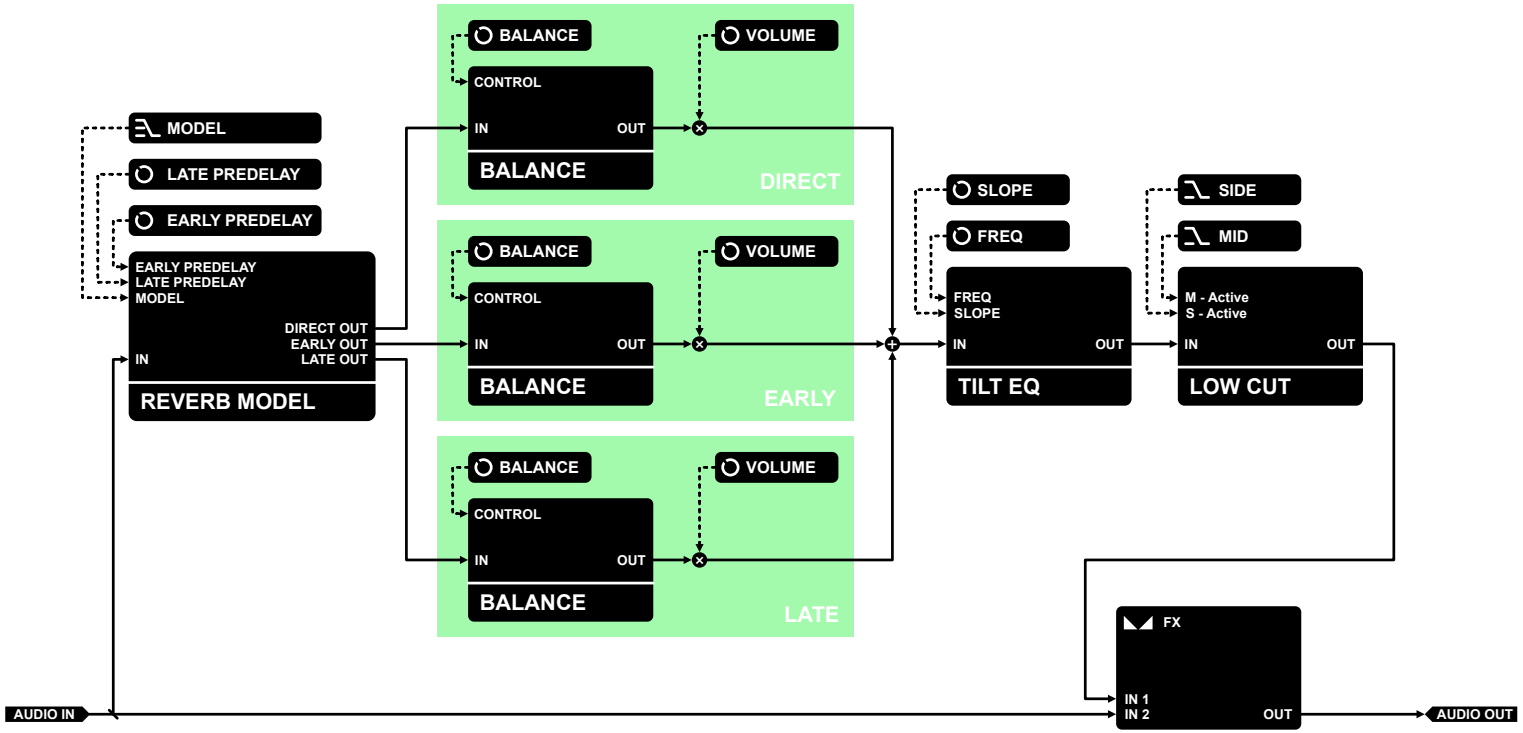


The Master section

- **Low Cut** – A passive *high-pass* filter for final shaping of the **Wet** signal, with cutoff frequency ranging from 10 Hz - 1 kHz. Process the **Mid** and **Side** components individually by toggling the relevant LEDs on or off.
- **FX** – Sets the proportional balance of the unprocessed (**Dry**) and processed (**Wet**) signals at the final output.
- **Output Volume** – Controls the final amplification level.

Signal flow

The diagram below shows the signal flow through **Spacerek:**



Spacerek's signal flow

Preset Management

Preset Storage

Presets – both those in the **Factory** library and those made by the **User** – are stored as files in specific folders on your hard drive. Every time the plugin is loaded, these folders are scanned and the presets they contain are consolidated in a linear structure in the **Preset Browser.**

Browsing Presets

The **Presets configuration and management** section enables easy navigation and browsing of the preset library.



Presets Configuration and Management Section

- **PRESET NAME** – Displays the name of the currently loaded preset.
- **PREV / NEXT** – Step backwards and forwards through the preset list (depending on the currently set filters – see below).
- **INIT** – *Win* (Ctrl + **PREV**), *Mac* (Cmd ⌘ + **PREV**) – Restore all plugin parameters to their initial settings.
- **RELOAD** – *Win* (Ctrl + **NEXT**), *Mac* (Cmd ⌘ + **NEXT**) – Restores parameters from the most recent checkpoint, which is re-initialization, loading a preset or loading a project (total recall).

- **SAVE** – *Win* (Ctrl + **BROWSE**), *Mac* (Cmd ⌘ + **BROWSE**) – Save the current parameters as a new preset or overwrite the existing one (see below).
- **BROWSE** – Fold the **Preset Browser** panel out from the bottom of GUI.

The **Preset Browser** looks like this:



Preset Browser

One can see three main sections:

- **Content** – The available preset resources.
- **Filters** – View only certain categories or types of presets (inactive by default).
- **Results** – The list of presets that meet the criteria set by the **Filters.**

Content

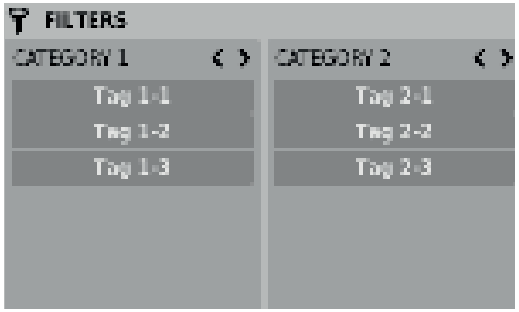
Select preset resources for browsing. There are two resources available:

- **Factory** – The presets that are included with the plugin. **Factory** presets are read-only (ie, they can't be overwritten).
- **User** – Presets created by the user. **User** presets can be freely modified, backed up as files, shared with others, etc.

Selecting a single **Content** resource narrows the filtered preset list down to presets from that resource only.

Preset Filters

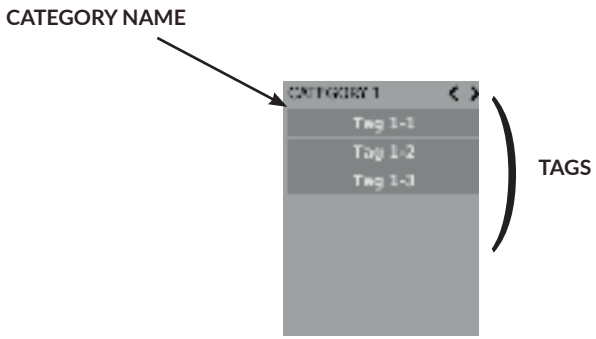
The browser enables classification of presets through the use of **Categories** and **Tags**, in order to facilitate filtering of the **Results** list.



Preset Browser Category Filters

Categories and Tags

Each preset is assigned to one or more of a few common **Categories**. Within each **Category** there may be one or more **Tags**.



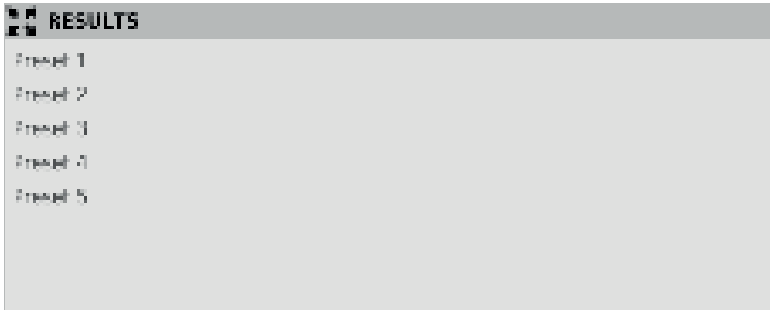
A single Category in a Filter with three Tags

The **Factory** presets come with **Categories** and **Tags** already assigned. These have been chosen to specifically describe the sounds and characteristics of those presets as representatively as possible, taking into account the remit of the plugin.

The **Categories** and **Tags** assigned to the **Factory** presets can't be edited. **User** presets, however, can be given **Categories** and **Tags** from the factory content, and you can also define your own custom **Tags**.

Results

The list of presets from the selected **Content** resources that meet the filtering criteria is displayed in the **Results** section. This is where the actual browsing and loading of presets is done (in the default **Browsing Mode**).

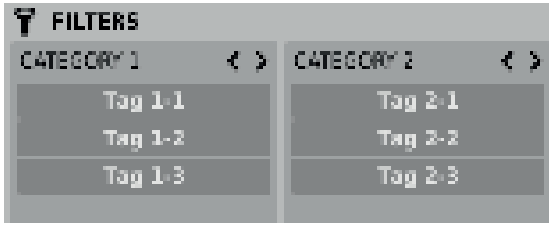


The Results section in the Preset Browser

Click the name of a preset to select and load it.
Double-click a preset to enter preset name edit mode. ◘

Presets Filtering

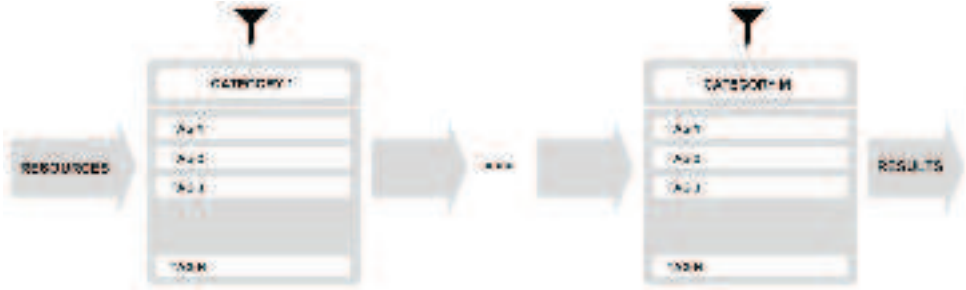
The columns in the **Filters** section represent particular **Category filters**, while the rows in each of these columns represent the **Tags** available within each **Category**.



Preset Browser Category Filters

The **Filters** cascade through the columns, from left to right: all presets in the selected Content resources are filtered according to the **Tags** in the first **Category** (the first column from the left), the remaining presets are then filtered by the **Category** represented by the second column, etc, up to the last active **Category Filter.**

◘ Possible only in the Edit Mode



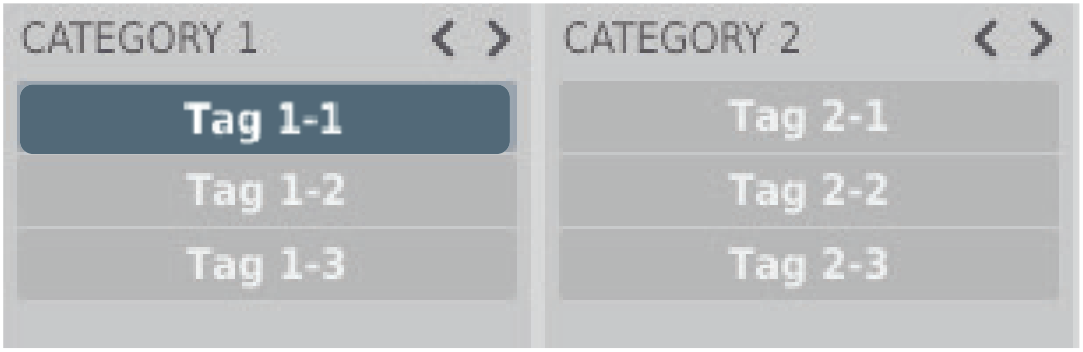
Preset Filtering with Category Tags

The result of this cascaded filtering process – ie, only the presets that meet the criteria of every active filter – is listed below, in the **Results** section.

Basic Actions on Filters

The **Tag** buttons in a **Filter** toggle between active and inactive when clicked: a grey **Tag** is inactive, and a teal blue **Tag** is active. A **Filter** is only active when at least one **Tag** in a column (**Category**) is active.

For example, if the first column in the illustration below represents the *Category* 1 **Category**, **containing** the *Tag 1-1*, *Tag 1-2* and *Tag 1-3* **Tags**, clicking the *Tag 1-1* Tag will activate the **Category Filter** *Category 1*, and narrow the preset list down to only the presets assigned the *Tag 1-1* **Tag** in the *Category 1* **Category**.



Enabling the 'Tag 1-1' Tag in the 'Category 1' Category

Clicking the *Tag 1-1* **Tag** again deactivates the **Filter**, so that all presets from the selected **Content** resources are displayed again.

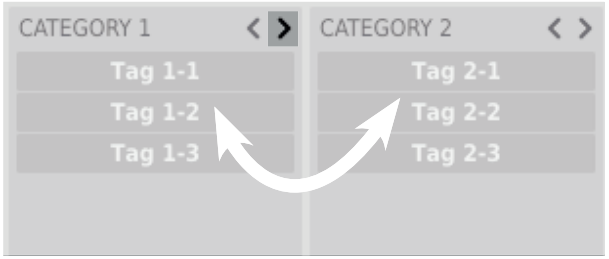
Reordering Categories

To the right of the **Category Filter** header are two arrow buttons:



Filter reordering

These move the **Category** left or right in the cascade. Clicking the right arrow swaps the current **Category** with the **Category** to the right; clicking the left arrow swaps the current **Category** with the **Category** to the left.



Presets Filtering with the Use of Categories Tags

Clicking the left arrow for the left-most **Category**, or the right arrow for the right-most category, does nothing, as the column has no predecessor/successor with which to swap.

Presets editing – Edit Mode

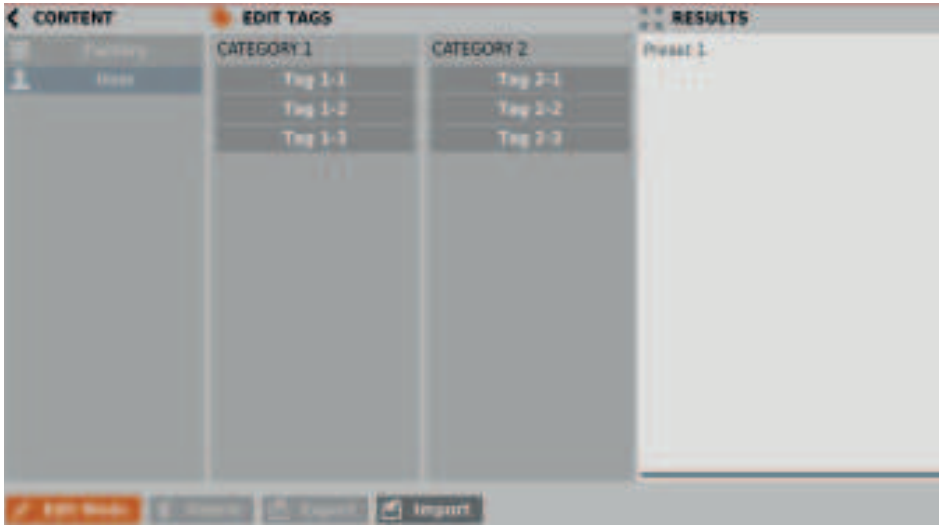
Activating **Edit Mode** in the **Preset Browser** enables the editing of preset names, **Categories** and **Tags**, as well as the deletion, export and import of presets. Note that these operations are only permitted for **User** presets, not **Factory** presets.

Enter and exit **Edit Mode** using the button in the bottom left-hand corner



The Edit Mode button

In **Edit** mode, the **Preset Browser** changes in appearance and function:



The Preset Browser in Edit Mode

1. The **Filters** section changes becomes the **Edit Tags** section, which looks almost identical but is used to change – rather than operate – the **Categories** and **Tags** of the selected presets.
2. Presets (**User** only – not **Factory**) are selected for editing in the **Results** section.
3. The **Delete**, **Export** and **Import** buttons at the bottom of the interface are used to delete or export selected **User** presets, and import a set of presets to the **User Content** resource.
4. The resource selection in the **Content** section can't be changed, as editing is only possible for user presets.

Selection of presets for editing

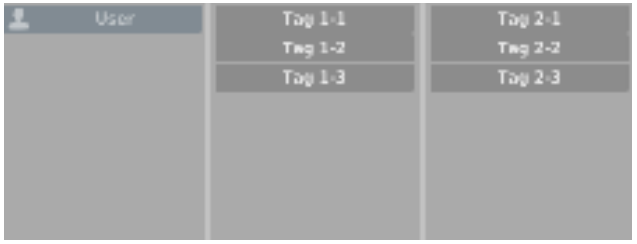
You can edit presets one at a time or in groups. Select one or more presets in the **Results** section using the following procedure:

- **Click a preset** – Choose the preset from the list,
- *Win* (Ctrl + **Click a preset**), *Mac* (Cmd ⌘ + **Click the preset**)– Add another preset to the selection.
- Shift + **Click a preset** – Select a contiguous series of presets from the last one selected to the one clicked.

Editing Tags

Changing the Tags assigned to the selected preset(s)

With one or more presets selected, click a **Tag** button to assign it, or unassign it if already assigned.



Filters' tags

Selecting multiple presets with **Tags** assigned enables those **Tags** to be edited. If a particular **Tag** is assigned to *all* selected presets, it's marked with an intense teal blue color.

When a particular **Tag** is only assigned to *some* of the selected presets, it's given a pale teal blue colour.

All **Tags** that don't appear in *any* of the selected presets are coloured grey.



Colouring of Tags by status for selected presets

Changing the **Tag** status for one selected preset changes it to the same status for *all* selected presets. The change of status is indicated by an asterisk (*) to the left of the **Tag** buttons.



Notification of changes to the Tag status of selected Presets

User edits don’t have to be confirmed. They’re indicated by asterisks next to the edited **Tag**.

Preset name editing

Double-click the name of a preset to enter name editing mode.

Deleting presets

Selecting one or more presets invokes the **Delete** button at the bottom left corner. Click this to delete the selected presets.

Preset export and import

Use the **Export** and **Import** buttons at the bottom of the **Preset Browser** to export the presets selected in the **Results** section as a package, or import a previously exported ◘ package into the Preset library.

◘ Export and Importare possible only for presets from User resources.

To save the current plugin parameter settings as a **User** preset click **BROWSE** in the **Configuration and Presets Browsing** section while holding -*Win* (Ctrl + **BROWSE**), *Mac* (Cmd ⌘ + **BROWSE**) in **Configuration and Presets Browsing** section. The **Preset Browser** will automatically open in **Edit Mode**.

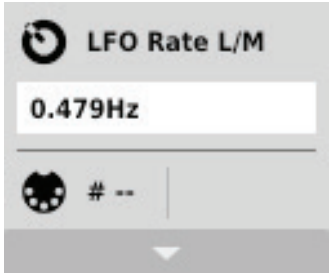


Saving the settings as a preset

Enter a name for your newly created preset in the text field at the bottom, then confirm it by clicking **Save**, or back out of the process by clicking **Cancel**.

As the **Preset Browser** automatically enters **Edit Mode**, you can immediately categorize the preset using the **Edit tags** functions before saving it.

Right-click any plugin parameter to open its contextual menu.



Closed contextual menu

Using this, you can:

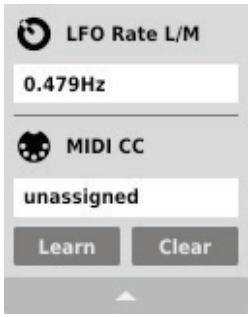
- Check the name and current value of a parameter,
- See whether or not the parameter has been assigned a MIDI CC number, and if so, which one,
- Link the parameter to a MIDI CC number.

Clicking the arrow strip at the bottom of the menu expands it to display all available options. Right-clicking the parameter again or left-clicking outside the menu area closes the contextual menu.

MIDI Learn

The **MIDI Learn** function enables quick assignment of physical MIDI controllers to plugin parameters. An assignment is made by following this procedure:

1. Right-click the parameter you want to assign to your hardware MIDI controller. The contextual menu opens.
2. Click the arrow strip at the bottom to expand the contextual menu.



Expanded contextual menu

3. Click the **Learn** button to put the plugin into a pending state, awaiting MIDI CC input from your hardware MIDI controller
4. Move the relevant knob or slider on your MIDI controller to make the assignment
5. Click **OK** to save the change or **Cancel** to restore the previous setting

MIDI Unlink

To delete the MIDI CC assignment for a plugin parameter:

6. Open the contextual menu by right-clicking the parameter in question
7. Expand the menu by clicking the arrow strip at the bottom
8. Click the **Clear** button
9. Confirm with **OK** button

Current settings

The **Current settings** are applied separately to each instance of the plugin but initialized with the **Default settings** when the plugin is loaded (see next chapter).

The **Current settings** are adjusted in the status bar at the bottom of the interface.



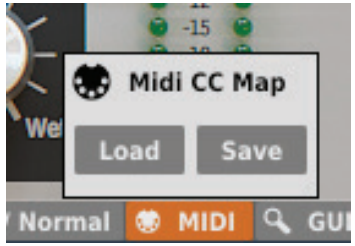
The Current settings in the status bar

From left to right, they comprise:

- Saving/Loading of the **MIDI CC Map**
- A choice of two **GUI** sizes

MIDI CC Map

Save all current MIDI CC parameter assignments as a MIDI Map file, or load an existing MIDI Map file into the plugin.



Saving/loading the MIDI CC Map

GUI size

Switch the graphical user interface between few different sizes.



Choosing the plug-in interface size

Default settings

Change the **Default settings** of the plugin in the **Options** panel. The **Current settings** of every new instance of the plugin are initialized to the **Default settings**.

The **Default settings** are stored in a configuration file. This file is updated after the **Options** window is closed.

Open the **Options** panel by clicking the **Options** button:



Options button

The **Options** panel is made up of four sections, only one of which can be expanded at a time.



Options Panel

The Three sections are:

- **Presets** - The preset loading warning dialog status
- **MIDI** - The default MIDI CC Map
- **User Interface** - The default GUI size

MIDI



Default MIDI Map Choice Section

Set the path to a default **MIDI Map** file. Clicking the **MIDI CC** Map checkbox 'unlocks' the **Browse** button and activates the selected MIDI Map.

User Interface



Default size of User Interface

Choose one of several default GUI sizes to best match the plugin to the resolution of your computer monitor.

Presets



Displaying confirmation dialog option

With the box checked, clicking the **Prev** or **Next** preset button after the parameters of the current preset (or previously initialized state) have been changed pops up a confirmation dialog to prevent accidental loss of those changes.

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