



d16 group
AUDIO SOFTWARE

DECIMORT2

HIGH QUALITY BIT CRUSHER



User Manual

Requirements

Software and hardware requirements of the product



Windows PC

OS version	Win 7, Win 8, Win 10
CPU	2.0 Ghz with SSE (Multicore system 2.1 Ghz recommended)
RAM	4 GB (8 GB Recommended)
Software	VST / AAX compatible host application (32bit or 64bit)



Mac OS X

OS version	OS X 10.7 or newer
CPU	Intel based 1.8 Ghz (2.4 Ghz recommended)
RAM	4 GB (8 GB Recommended)
Software	AU / VST / AAX compatible host application (32bit or 64bit)

Overview

Decimort is a stereo high quality (ultra low aliasing) bit crusher.

After loading the plug-in within a host application, the GUI will appear:



Decimort graphical interface

There are two sections:

- Configuration and preset management



Configuration and preset management section

- Signal processing control section consists of the all remaining controls

Signal flow

This chapter describes the path of the signal's flow through the Decimort plug-in, presents the basic components of this effect unit and its control parameters.

Basic modules

The inside of Decimort consist of a few basic components, that correspond to the sections on the graphical interface:

Pre-amplifier

Preamplifier, controlled by **Preamp** knob, boosts the input signal within *0dB* to *+48dB* range.



Preamp Parameter

Quantizer

Responsible for signal's amplitude quantization. In other words it divides the amplitude to specified (**Resolution** display) number of levels.



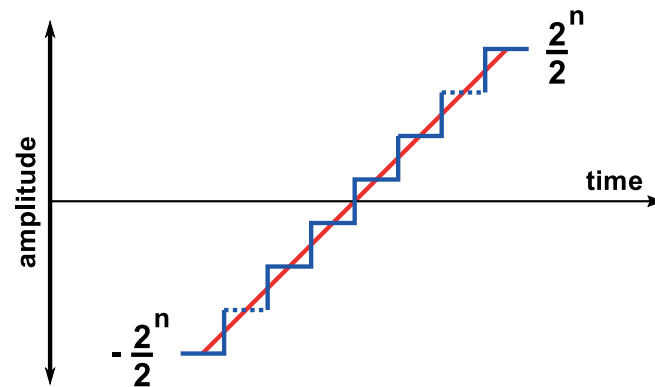
Quantizer module

The quantizer is controlled by the following parameters:

- **Resolution** - The number of bits the input signal's amplitude is degraded to, which corresponds to $2^{\text{Number of bits}}$ actual quantization levels. ▣ Selecting "--" value deactivates the whole **Quantizer** module.
- **DC Shift** - Quantization mode

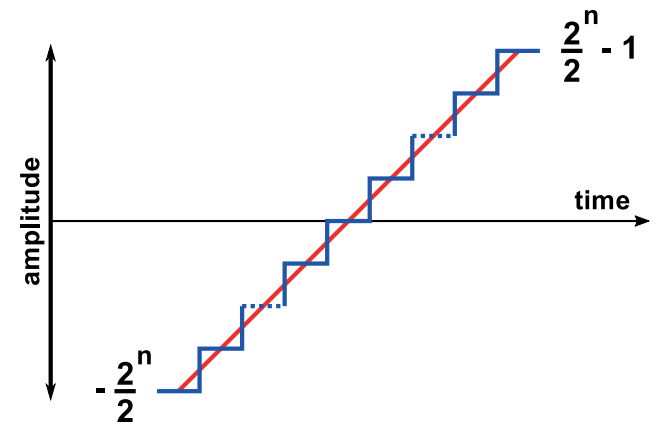
- ▣ For example, when the **Resolution** is set to 8 bits, it means **Quantizer** discretizes the amplitude to 256 different levels.

- DC Shift LED off enables the *mid-riser* quantization mode.



Nonzero quantization (*mid-raiser*)

- DC Shift LED on, enables the *mid-tread* quantization mode

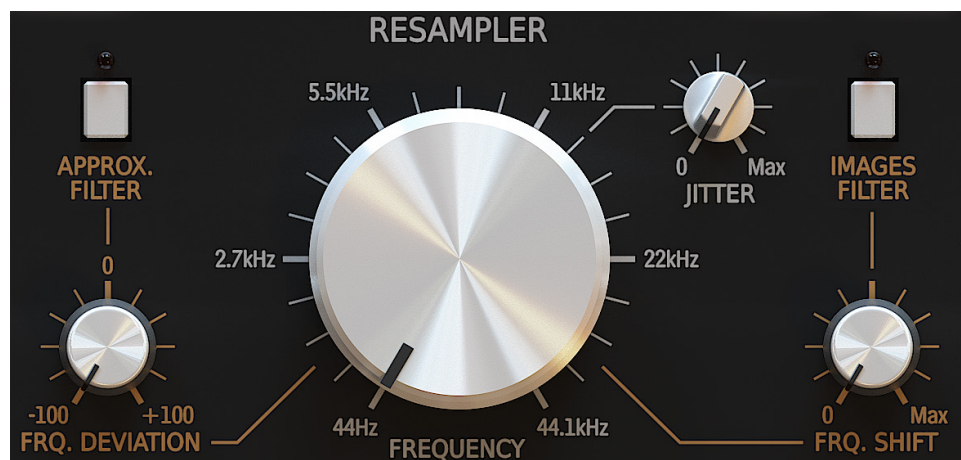


Quantisation including zero (*mid-tread*)

- **Dithering** - The intensity of the half-bit white noise, that is added to the signal just before the quantization. It reduces the harmonic distortions, being a result of signal's amplitude degradation, by masking the side effects of quantization.

Resampler

This section controls the discretization process of the input signal in the time domain



Resampling unit

Main parameters are located in the center of this section, and these are:

- **Frequency** - The frequency the signal is discretized to (resampled). This parameter ranges from 44 Hz to 44.1 kHz
- **Jitter** - Controlling the intensity of random, short-period **Resampler's** deviations ▢.

▢ Jitter is the deviation from true periodicity of a presumed periodic signal, often in relation to a reference clock source

Additional parameters located aside the main controls, supervise processing the signal before and after time discretization (**Resampling**). These include:

- **Approximative Filter** - Processing signal before resampling
- **Images Filter** - Processing signal after resampling

Approximative Filter

Optionally activated filter, which removes part, or entire harmonic content, above the **Resampler's Nyquist frequency**  from the input signal. Therefore controlling the amount of aliasing that occurs at the output (below the resampling frequency).

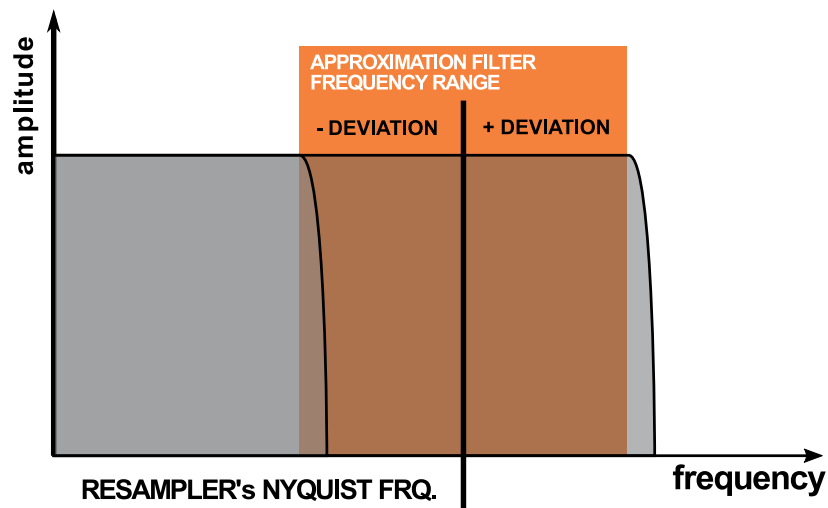
The **Approximative filter** module processes the input signal before it gets onto **Resampler**.



Resampler's Approximation filter

The **Approximative filter** is controlled by the following set of parameters:

- **Approx. Filter** - The toggle button activates / deactivates the filter
- **Frq. Deviation** - Cut-off frequency of the **Approximative filter** is coupled with the **Nyquist's frequency** of the **Resampler**. The offset between the filter's cutoff frequency and the **Resampler Nyquist frequency** is controlled by **Deviation** parameter.
 - **Deviation = 0** (*the default*) - Sets the **Approximative Filter's** cutoff frequency, exactly at the *Nyquist frequency* (no offset). This results in the removing the entire harmonic content above the *Nyquist frequency*, which prevents the artifacts from appearing below the *Nyquist*. The only type of artifacts occurring are images (harmonics occurring above the *Nyquist*).
 - **Deviation < 0** (*negative offset*) - Sets the **Approximative filter's** cutoff frequency below the *Nyquist frequency*. Consequently, at the output, as for **Deviation = 0** value, the only type of occurring artifacts will be images (no aliasing). Additionally a part of the original harmonic content below the *Nyquist frequency* will also be removed (proportionally to the negative **Deviation**) as well as some images near the *Nyquist*.
 - **Deviation > 0** (*positive offset*) - Sets the cutoff frequency above the *Nyquist frequency*. As the result aliasing starts to appear (artifacts below *Nyquist frequency*) in proportion to positive **Deviation**.



The cutoff frequency range of the approximative filter.

Images filter

Images are the artifacts resulting from **Resampler's** activity, that is the result of projecting a signal from a higher sampling rate to a lower / reducing signal's sample rate. **Images Filter** allows to remove part, or all of these artifacts from the spectrum after discretization process. As a result, Decimort can also serve as a *alias-free brickwall lowpass filter*.

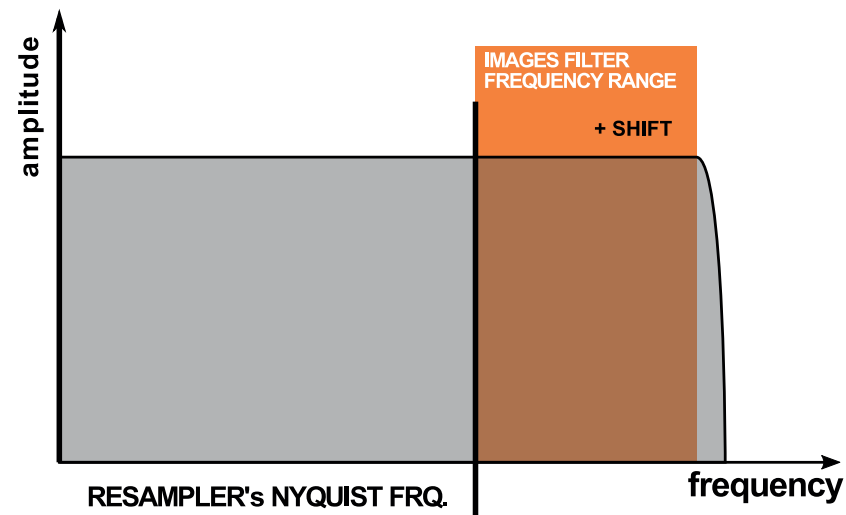
Images Filter's module processes the signal after it passes the **Resampler**.



Resampler's Images Filter

Images Filter is controlled by the following set of parameters:

- **Images Filter** - Toggle button for its activation / deactivation
- **Frq. Shift** - Cut-off frequency of the **Images Filter** is coupled to the **Resampler's Nyquist frequency**. **Frq. Shift** parameter is a distance (offset) between **Images Filter's** cutoff frequency and **Resampler's Nyquist frequency**. The higher the value of this parameter, the higher harmonics (above **Resampler's Nyquist**) are passed onto the output.



Images filter cutoff frequency range

Filter

After (or before) crushing signal we can also filter it a bit by analogue-like (pass/reject) filters with adjustable resonance.



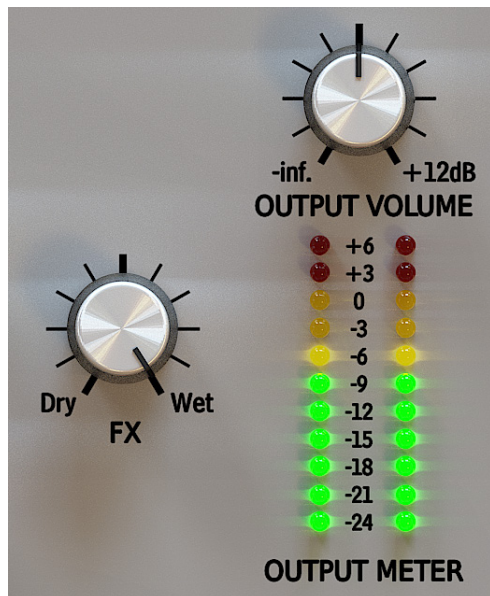
Filtering section

Filter section is controlled by a following parameters:

- **Filter type** – There're 4 types of filters we can choose from: **LP** (*low pass*), **BP** (*band pass*), **HP** (*high pass*) and **BR** (*band reject*). **OFF** position – turns the filter off.
- **Cutoff** – Cutoff frequency for **LP** and **HP**, and center of the band for **BR** and **BP**.
- **Reso/B.Width** – Resonance for **LP** and **HP**, and band width for **BR** and **BP**.
- **Order** – This switch has two values: when switch set to **Pre**, signal is filtered then quantized and resampled, **Post** – in this position, signal is first quantized / resampled and then filtered.

Master section

This section controls the end of signal's flow.

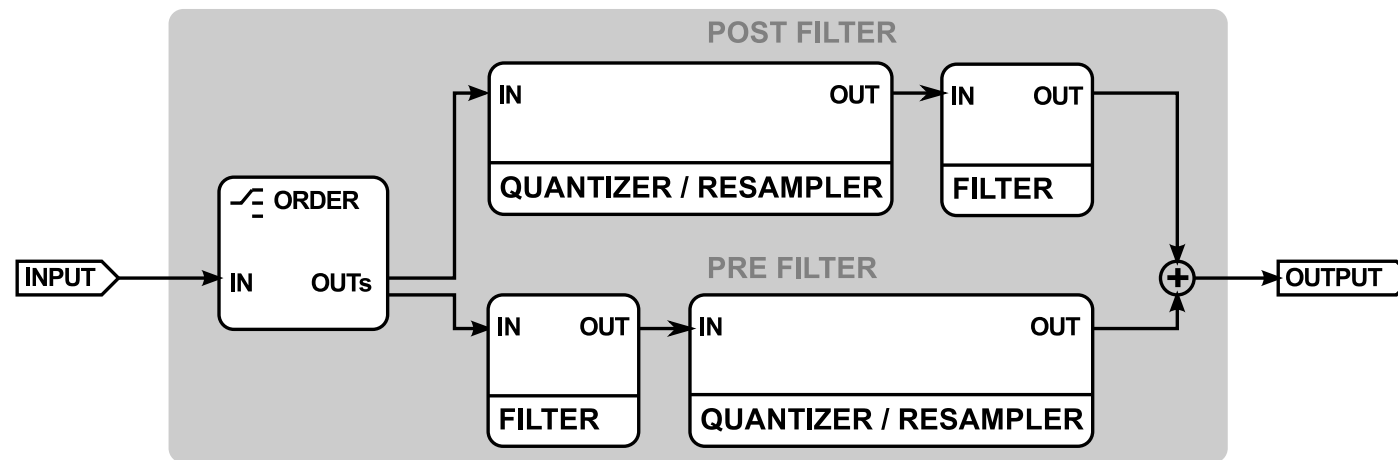


Master section

The **FX** knob defines the ratio between the processed/unprocessed sound that is sent to an audio out. **Output volume** controls the final amplification.

Path of the signal's flow

See diagram below, that show the signal path inside Decimort.



Signal flow through quantizer / resampler and filter only

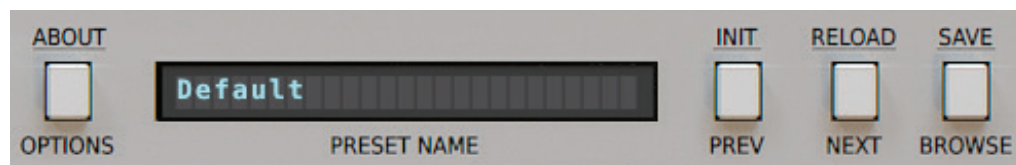
Preset Management

Preset Storage

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

Browsing Presets

Presets Configuration and Management section enables quick navigation and browsing the presets structure:

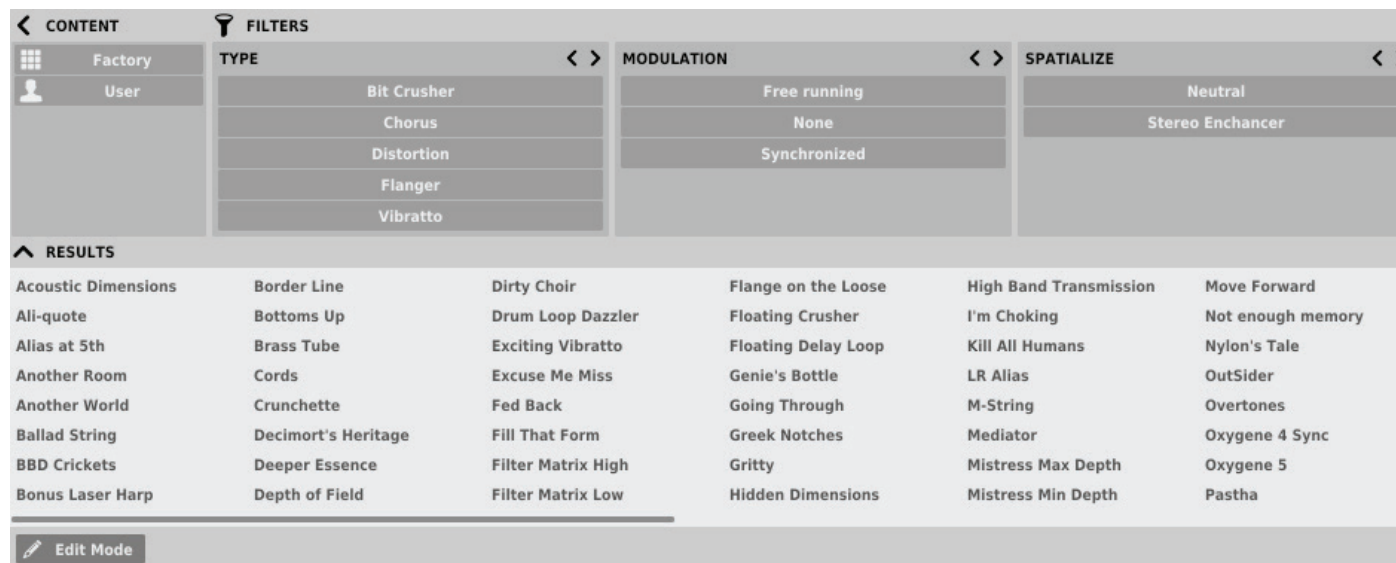


Presets Configuration and Management Section

- **Preset Name** – Displays the name of the currently loaded preset.
- **Prev / Next** – Buttons that allow for linear browsing of presets list (depending on currently set filters – see sections below).
- **Init (Prev + CTRL) ▣** – Simultaneous use of the **Prev** button and the **CTRL** key restores initial settings of plug-in parameters.
- **Reload (Next + CTRL) ▣** – Simultaneous use of the **Next** button and the **CTRL** key reloads a current preset.

- **Save (Browse + CTRL)**  – Simultaneous use of the **Browse** button and the **CTRL** key saves current parameters as a new preset or allows for overwriting of the existing one (see sections below).
- **Browse** – Expands the **Preset Browser** panel at the bottom of GUI section.

The **Preset Browser** looks as follows:



Preset Browser

One can see three main sections:

- **Content** – Sources from which presets can be read.
- **Filters** – Configuration of presets **Filters** (non-active by default).
- **Results** – List of presets from resources that meet criteria set by **Filters**.

Resources

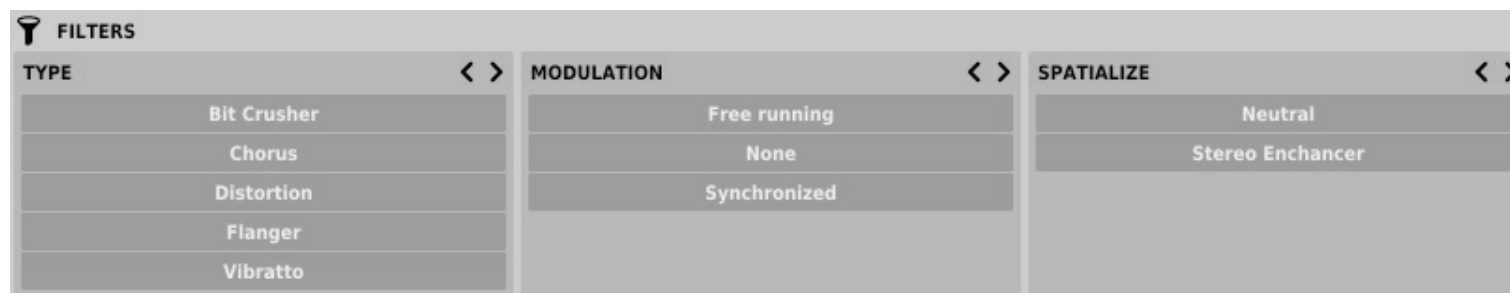
In this section you can choose a resource/resources in which you want to browse presets. There are two resources to choose from:

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

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

Preset Filters

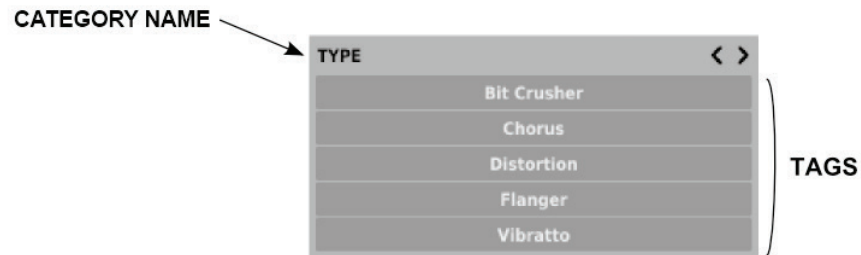
The plug-in enables classification of presets with the use of **Categories** and **Tags** system, whose aim is to facilitate the process of browsing the content by filtering.



Preset Browser Categories Filters

Categories and Tags

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



A single category in a filter with a description of its elements

Presets from **Factory** resource were described by **Categories** and **Tags** during the stage of its creation. **Categories** and **Tags** are chosen in such a way so as to describe the content in the best possible way, taking into account the plug-in purpose.

Edition of **Categories** and **Tags** in case of **Factory** content is not possible – it is blocked. **User** presets may be described only with **Categories** and **Tags** from factory content or, alternatively, the users may define their additional **Tags** in order to describe their own presets.

Results

This is a list of presets from chosen resources that meet the filtering criteria. The basic function of this section is browsing and loading presets (in **Browsing Mode** – by default).

^ RESULTS					
Acoustic Dimensions	Border Line	Dirty Choir	Flange on the Loose	High Band Transmission	Move Forward
Ali-quote	Bottoms Up	Drum Loop Dazzler	Floating Crusher	I'm Choking	Not enough memory
Alias at 5th	Brass Tube	Exciting Vibratto	Floating Delay Loop	Kill All Humans	Nylon's Tale
Another Room	Cords	Excuse Me Miss	Genie's Bottle	LR Alias	OutSider
Another World	Crunchette	Fed Back	Going Through	M-String	Overtones
Ballad String	Decimort's Heritage	Fill That Form	Greek Notches	Mediator	Oxygene 4 Sync
BBD Crickets	Deeper Essence	Filter Matrix High	Gritty	Mistress Max Depth	Oxygene 5
Bonus Laser Harp	Depth of Field	Filter Matrix Low	Hidden Dimensions	Mistress Min Depth	Pastha

Results Section in Preset Browser

Click any name to choose and load the preset.

Double-click the name to enter preset name edit mode. ▶

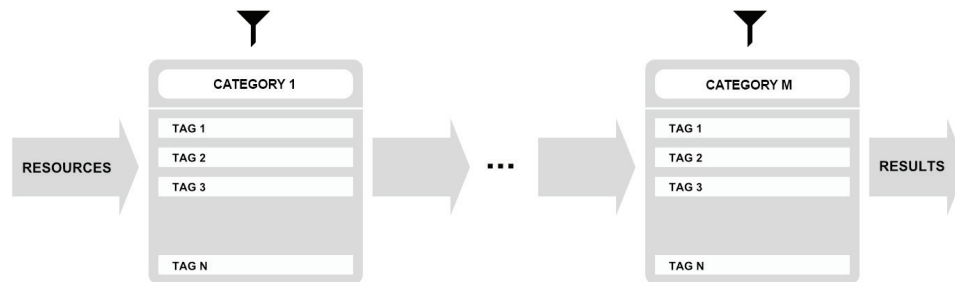
Presets Filtering

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

🔧 FILTERS		
TYPE < >	MODULATION < >	SPATIALIZE < >
Bit Crusher	Free running	Neutral
Chorus	None	Stereo Enhancer
Distortion	Synchronized	
Flanger		
Vibratto		

Preset Browser Categories Filters

Filtering results have a form of a cascade (columns), from left to right. This means that all presets available in the selected resources are filtered as to presence of **Tags** from the first **Category** (first column from the left), next a set of presets being a result of filtering by the first **Category** is filtered by the **Category** represented by the second column etc., until it is filtered with the last active **Category Filter**.



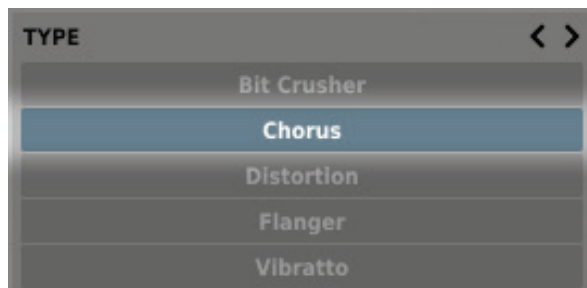
Presets Filtering with the use of Categories Tags

The result of a cascade filtering process (presets that meet the criteria of each filter) is listed below, in the **Results** section.

Basic Actions on Filters

Tag buttons in **Filters** work in toggle mode. Click to activate/deactivate **Tag** (Grey color means that the **Tag** is inactive, teal blue means that the **Tag** is active). If at least one **Tag** in a column (**Category**) is active, then the **Filter** also becomes active.

For example, if the first column represents **Type Category** with a set of the following **Tags**: {*Bit Crusher*, *Chorus*, *Distortion*, *Flanger*}, clicking the **Chorus Tag** will activate the **Category Filter Type** and narrow down a list of presets to the items in case of which the **Chorus Tag** appeared in the **Type Category**.



Enabling Chorus tag in Type Category

If you click the *Chorus* item again, you will deactivate the **Filter**, so all presets from the content will be displayed again.

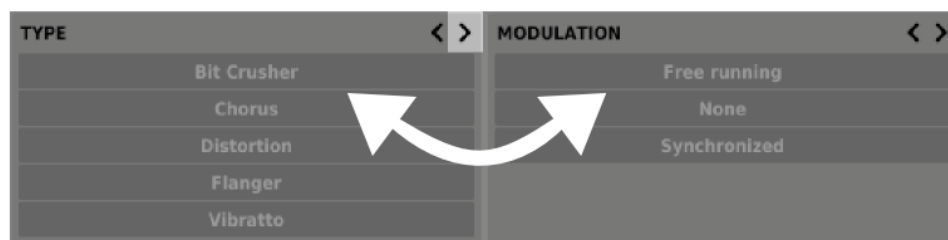
Reordering Categories

To the right of the **Category Filter** header there are buttons with arrow icons:



Filter reordering

They enable moving the **Category** to the left or right in a cascade. Clicking the right arrow replaces the current **Category** with the **Category** on the right. Clicking the left arrow replaces the current **Category** with the **Category** on the left.



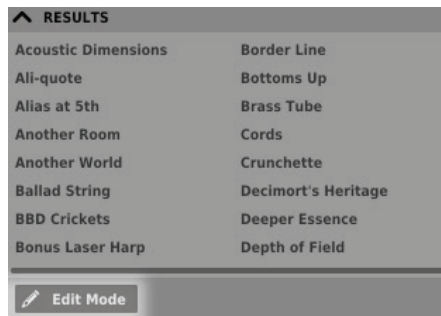
Presets Filtering with the Use of Categories Tags

Clicking the left arrow for the **Category** located on the far left does not change anything. The same is true for the **Category** located far to the right and right arrow (as the column has no predecessor/successor with which it could be replaced).

Presets Editing – Edit Mode

An active **Edit Mode** in **Preset Browser** changes its function (enables the change of presets names, edition of **Categories** or **Tags**, deletion of presets as well as their export or import. One should bear in mind, however, that these operations are not allowed in case of **Factory** presets, but only for the **User** presets.

Edit Mode can be activated with a button located in the bottom left-hand corner (click again to deactivate):



Edit mode button

In this mode **Preset Browser** slightly changes its appearance (not only function):



Preset Browser in Edit mode

1. The **Filters** section changes into the **Edit Tags** section, whose appearance is almost identical, but the function is different. The section is used not as a filter, but as an editor of **Categories** and **Tags** of chosen presets.
2. The role of the **Results** section is to choose presets for edition (edition is possible only for user presets).
3. At the bottom of the screen there are **Delete**, **Export** and **Import** buttons used respectively to delete or export selected **User** presets as well as to import a set of presets to the **User** resources.
4. The choice of the resource in the **Content** section does not work, as edition is possible only for user presets.

Selection of Presets for Edition

You can edit both single preset and a set of presets. Using the functionality of the **Results** section, you can choose a preset or a set of presets in the following way:

- **Click the preset** – Choose the preset from the list,
- **Click the preset + press CTRL** – Add another preset to an already chosen preset or a set of presets,
- **Click the preset + press SHIFT** – Select a part of a list of presets from the last chosen preset to the item clicked together with **SHIFT** button.

Tags Edition

Change of Tags status in Presets

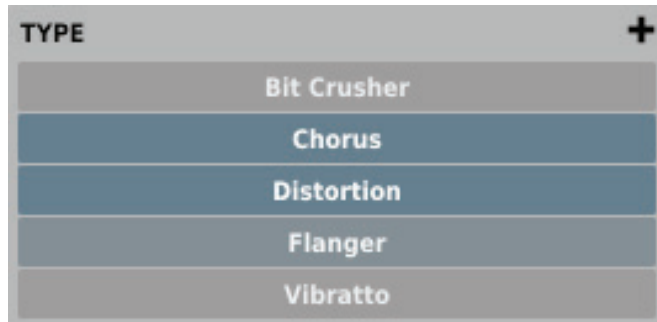
Tag buttons work in toggle mode, similarly as in case of filtering. Clicking them you can respectively set **Tag** or erase them from chosen presets.

Bit Crusher	Free running	Neutral
Chorus	None	Stereo Enhancer
Distortion	Synchronized	
Flanger		
Vibratto		

Filters' tags

Choosing a greater number of presets, in which the tags were already defined, enables their re-edition. Consequently; in case when a specific **Tag** appeared in all selected presets, it will be marked with an intensive teal blue color.

When a specific **Tag** is set only in a part of chosen presets, then it is codified with a pale teal blue. The **Tag** that does not appear in any of the presets is marked with grey colour:



Notification about Tags Status in Chosen Presets

The change of the **Tag** status for one or more chosen presets sets or erases this **Tag** in all these presets. The status change is signalized with an **Asterisk** located to the left of the **Tag** buttons .



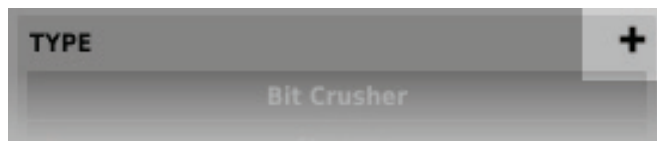
Notification about Changes in Tags Status in Chosen Presets

Elements/**Tag** buttons highlighted with pale teal blue colour (meaning different values of a particular **Tag** buttons for the highlighted pre-sets) work in a three-state system; erasing the **Tag** (grey colour), setting of the **Tag** (intensive teal blue colour) or no changes (pale teal blue) for all selected items.

Changes introduced during edition do not have to be confirmed, they are signalized by asterisks located by **Tag** changed for particular presets

Adding New Tags

Using the **Plus** button in the **Category** header, you can add new **Tag** to a particular **Category** (for chosen presets):



Adding New Tag Button

After clicking you will see a dialogue box with a question about the **Tag** name. After confirmation the **Tag** will be added to a particular **Category** and automatically set to chosen preset(s).

Presets Names Editing

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

Deleting Presets

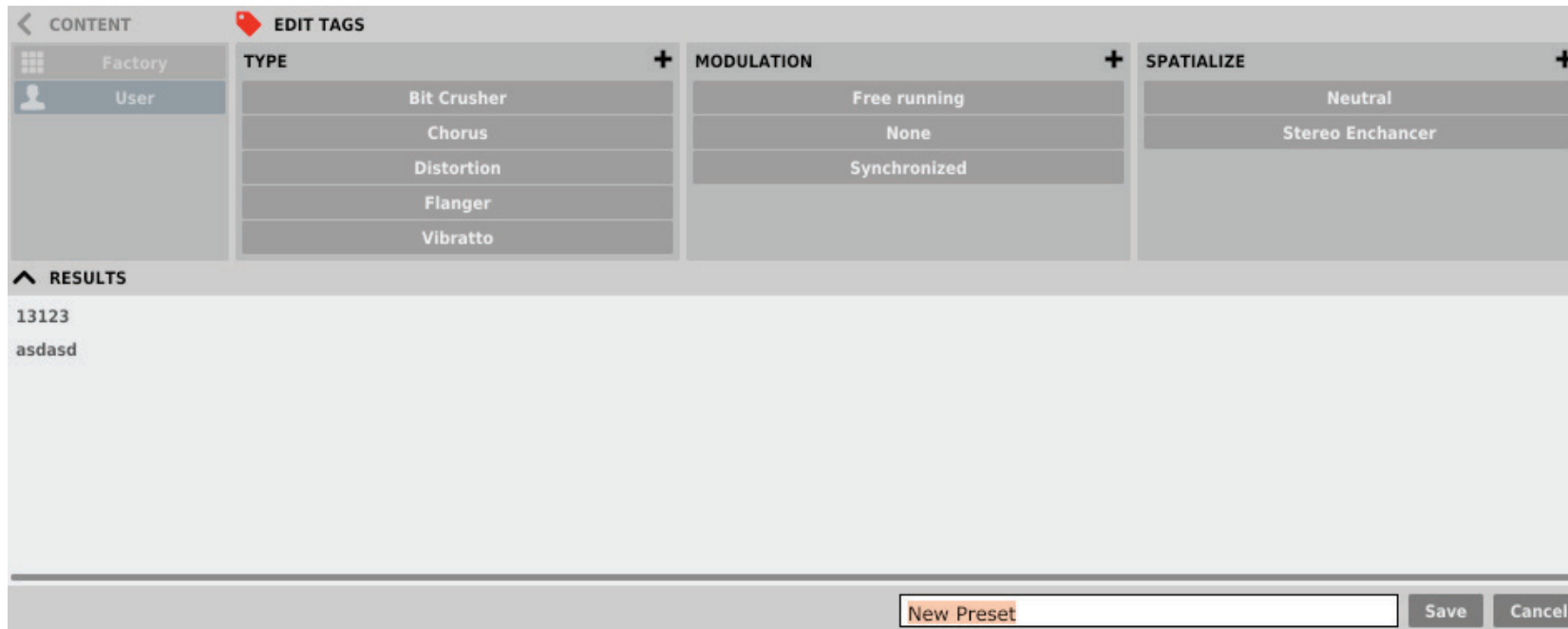
Selection of one or more presets activates **Delete** button at the bottom left corner. It can be used to delete the selected presets.

Presets Export and Import

The use of **Import** or **Export** buttons at the bottom part of the **Preset Browser** enables a proper import of presets package (exported before) or export to the presets package ▣ the presets selected in the **Results** section.

Saving the current settings as Preset

To save plug-in parameters settings as a user preset use the **Browse** button pressed together with **CTRL** button in **Configuration** and **Presets Browsing** section. This action automatically opens the **Preset Browser** with an active **Edit Mode**.



Saving the Settings as Preset

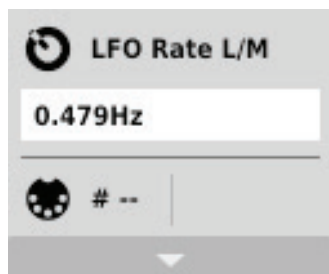
Additionally, at the bottom there will be a textbox into which you should enter a name of a newly created preset, and then confirm it by clicking **Save** or cancel by clicking **Cancel**.

As the **Preset Browser** is in the **Edit Mode** before confirmation of the newly created setting as preset, we can straightaway categorize a particular setting, using functionality of the **Edit tags** section, even just before saving it as **Preset**.

Configuration

Parameter settings

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



Closed Context Menu

It allows for:

- Checking the name and current value of a parameter,
- Checking if the parameter is attributed to MIDI CC controller, and if it is – to which number,
- Linking the parameter to MIDI CC controller.

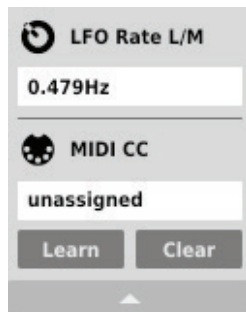
Clicking the arrow in any area of the menu expands it and displays all available options.

Next right-click on the parameter or left-click outside the menu area closes it automatically.

MIDI Learn

MIDI Learn function enables a quick assignment of physical controllers (from MIDI controller) to plug-in parameters. The assignment can be divided into a few steps:

1. Right-click the parameter which you want to attribute to physical MIDI controller in order to expand the context menu.
2. Click arrow at the bottom in order to expand the context menu.



Expanded Context Menu

3. Click the **Learn** button to put the plug-in into a pending state until you move any MIDI CC controller.
4. Click **OK** to save the change or click the **Cancel** button to restore the previous setting.

MIDI Unlink

You can also delete MIDI CC code attributed to plug-in parameter from the context menu:

5. Open the context menu, right-clicking the parameter attributed to a particular MIDI CC
6. Expand the menu, using the arrow at the bottom
7. Click the **Clear** button
8. Confirm with **OK** button

Plug-in's current settings

Current settings are relevant to a specific instance of a plug. They are initialized with the **Default settings**, when the plug-in is loaded (see the next chapter):

At the bottom of UI there is a status bar that enables the change of **Current settings**.



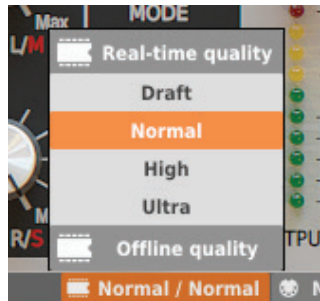
Current Settings in a Status Bar

From left to right there are:

- The setting of **Current processing path quality** for the **Offline** mode and the **Real-time** mode
- Saving/Loading the **MIDI CC Map**
- The choice of current size of GUI

Processing Path Quality

Clicking the item expands the menu that allows to select the **Current quality** of generated sound for **Real-time** or **Offline** modes.

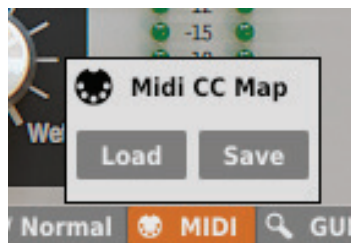


Processing Path Quality Settings

We can choose from four available grades for each mode.

Saving/Loading the MIDI CC Map

This item enables to save current parameters of MIDI CC codes as MIDI Map in a file or to load them.



Saving/Loading the MIDI CC Map

Current Size of GUI

This last item allows for a choice of plug-in interface size. There are two sizes to choose from:



Choosing the plug-in interface size

Plug-in's default settings

The **Options** panel allows us to change the **Default settings** of the plug-in. Every time the plug-in is loaded in the host application (new instance is created) a **Default settings** are used for initialization of the **Current settings**.

Default settings are stored within a configuration file of the plug-in. This file is updated at the moment of unloading any of active plug-in instances from the host application.

Use the **Options** button on GUI to open the panel:



Options button

The **Options** panel operates as an accordion where you can click a specific section to expand it:

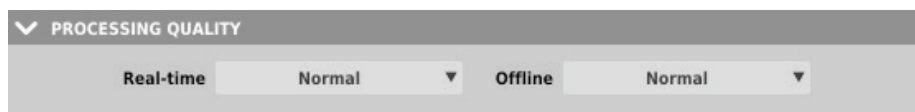


Options Panel

There are three sections:

- Processing Path Quality
- **MIDI Map Setting**
- Interface size settings

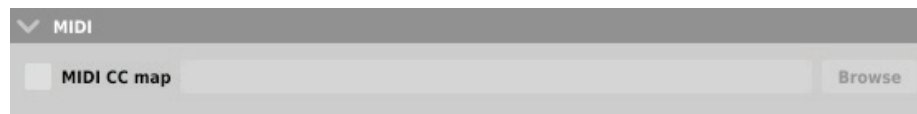
Default Processing Path Quality



Processing Quality Choice Section

In this section you can configure a default quality of the processing path for the **Real-time** mode and the **Offline** mode.

Default MIDI CC Map



Default MIDI Map Choice Section

This section allows for setting of a path to a file with a default **MIDI Map** that was prepared before. Clicking **MIDI CC Map** check box activates load of **MIDI Map** and the possibility of pointing it (**Browse** button).

Default size of UI



Processing Quality Choice Section

In the **User Interface** you can choose a default size of the UI.

Thanks

Goes to:

Ariel Proksa - ArxProAudio - For contributing some presets to the Factory Content.

Laurent Bergman - For his help with preparing french versions of manuals for D16 products.

CONTENTS

Requirements.....	2
Overview	3
Signal flow	4
Basic modules.....	4
Pre-amplifier	4
Quantizer	5
Resampler	7
Approximative Filter	8
Images filter.....	10
Filter.....	12
Master section.....	13
Path of the signal's flow	14
Preset Management.....	15
Preset Storage	15
Browsing Presets	15
Resources.....	17
Preset Filters	17
Categories and Tags	18
Results	18
Presets Filtering	19
Basic Actions on Filters	20
Reordering Categories	21
Presets Editing – Edit Mode.....	21
Selection of Presets for Edition	23
Tags Edition	23

Change of Tags status in Presets.....	23
Adding New Tags	24
Presets Names Editing.....	25
Deleting Presets.....	25
Presets Export and Import.....	25
Saving the current settings as Preset	26
Configuration.....	27
Parameter settings.....	27
MIDI Learn.....	28
MIDI Unlink.....	29
Plug-in's current settings.....	29
Processing Path Quality	30
Saving/Loading the MIDI CC Map.....	30
Current Size of GUI	31
Plug-in's default settings	31
Default Processing Path Quality	32
Default MIDI CC Map.....	33
Thanks	34