

Operation Manual



FM LAB

A new kind of FM experience

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FM Lab

In the early 1980s, FM synthesis changed the sound of popular music forever. Now, with FM Lab for HALion, you can design FM sounds with an ultra-modern, intuitive user interface. Featuring classic eight-operator FM synthesis, a vast array of modulators, pristine effects, a powerful arpeggiator, and the possibility of drawing multi-stage envelopes freehand, FM Lab adds a new dimension to digital synthesis.

The user interface of FM Lab consists of two main pages, the **Synth** page and the **Arp** page.



FM Synthesis

Frequency modulation refers to the modulation of one waveform by another waveform, which results in a new, more complex waveform.

Operators

The waveforms used to create the FM sound are called operators. You can use up to eight operators. An operator can either be a carrier or a modulator.

Carriers

Carrier operators send their signal to the output, that is, their signal is audible.

Modulators

The signal of the modulator operators is not sent to the output, but is instead used to modulate the signal of the carrier operator.

Algorithms

The combination of the up to eight operators forms an algorithm. The algorithm defines how many carriers and modulators are used, the order in which they are executed, whether operators feed their signal back to themselves, creating feedback connections, and more. You can either select one of the preset algorithms or create your own algorithms.

Synth Page

The **Synth** page provides an overview of the most important parameters. It is divided into an upper and a lower section.

Upper Section

In the upper section of the control panel, you can find the main synthesis pages: **FM Oscillator**, **Pitch**, **Filter**, and **Amp**.



You can maximize a page by clicking on its page header. In the maximized view, all parameters for a page are available. To return to the overview page, click the section header again.

As soon as one of the pages is maximized, page buttons become available to the left of the section headers. These allow you to open another page in maximized view.



Lower Section



The lower section contains the **Effects** section on the left, and the **Voice** page, **LFO** pages 1-4, the **User Envelope** page, the **Stepmodulator** page, the **Modulation Matrix** page, and the **Import** page on the right.

The pages in the lower section cannot be maximized. Their size is fixed, with all available parameters displayed at all times.

RELATED LINKS

- [FM Osc Page](#) on page 6
- [Algorithm Editor Page](#) on page 11
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FM Osc Page

The **FM Osc** page contains the settings for the FM oscillator.

From the preset menu, you can load pure FM oscillator presets that do not affect the other features of the synthesis structure, such as the **Pitch**, **Filter**, and **Amp** parameters, or the modulations. Except for the modulations, a preset can recreate a DX7 program. You can use the presets as they are or create static spectrums that can serve as starting points for a more classic subtractive sound design approach, for example.

Overview

In overview mode, the page shows the waveform display and the global parameters.



The waveform display works like an oscilloscope and shows the signal of the entire synthesis structure before the signal is fed into the effects. Playing a single note allows you to visualize the resulting waveform of the synthesis, whereas polyphonic playing shows the sum of all voices.

To quickly change the preset in terms of its temporal progression and spectral richness, you can use the four global FM parameters.

Modulator Times Scale

Allows you to lengthen/shorten the overall level envelope time for all operators that act as modulators. This way, all operators that modify the frequency spectrum are adjusted at the same time.

Modulator Levels Scale

Allows you to increase/decrease the output levels for all operators that act as modulators. This way, all operators that modify the frequency spectrum are adjusted at the same time.

Carrier Times Scale

Allows you to lengthen/shorten the overall level envelope time for all operators that act as carriers. This way, all operator envelopes that define the level contour of a sound are adjusted at the same time.

Global Feedback

Allows you to scale the global intensity of all feedback signals.

Maximized View



Waveform

Allows you to select a waveform for the operator.

Skirt

Determines the spread of the skirt at the bottom of the formant harmonics curve.

- For the **All1**, **All2**, **Odd1**, **Odd2**, **Res1**, and **Res2** waveforms, higher values produce a wider skirt, and smaller values result in a narrower skirt.
- For the **Saw** and **Saw Rounded** waveforms, **Skirt** changes the saw wave from a falling to a raising edge.
- For the **Square** and **Square Rounded** waveforms, **Skirt** changes the pulse width from square to pulse.

NOTE

This parameter is not available for the **TX81Z**, **SY99**, **Sine**, and **Noise** waveforms.

Resonance

Allows you to add resonance when **Waveform** is set to **Res 1** or **Res 2**. In order to do so, shift the center frequency of the wave spectrum to a higher frequency.

- With a setting of 0, the center frequency is the same as the fundamental frequency.
- With a setting of 99, the center frequency is shifted to the 100th harmonic.

Key On Reset

Activate this parameter to reset the phase of the operator with each note played.

Initial Phase

Adjusts the start phase of the operator waveform when **Key On Reset** is activated. The phase can be set to a value between 0 and 360°.

Ratio Frequency Mode

Coarse

Allows you to set the basic frequency of the operator – as a multiple of the frequency of the played notes.

Fine

Allows you to fine-tune the pitch of the operator. The step sizes depend on the **Coarse** setting.

Resulting Ratio

Shows the result of the **Coarse** and **Fine** settings.

Detune

Slightly detunes the pitch of the operator.

Fixed Frequency Mode

Frequency

Allows you to set a fixed frequency for the operator.

Detune

Slightly detunes the pitch of the operator.

Pitch Key Follow

Determines how the pitch depends on the note played.

- With a setting of 0, all notes have the pitch set by the **Coarse** and **Fine** parameters.
- With a setting of 99, adjacent notes are pitched in semitone steps.

Pitch Velocity Sensitivity

Determines how the pitch of the operator responds to velocity.

- With positive values, the harder you hit the keys, the more the pitch rises.
- With negative values, the harder you hit the keys, the more the pitch is lowered.
- With a setting of 0, the pitch does not change.

Envelope Display



The graphical envelope editor at the top contains a fixed set of nodes that represent the different envelope levels and times.

Time

The **Time** values represent the time it takes to reach the corresponding level. For the **Hold** parameter, the value represents the time in which the envelope remains on the start level. The start level is determined by the **Release Level** setting.

Level

This value allows you to reduce the dynamic range of the envelope. This parameter can be set to values between -96 and 0 dB. If you change the **Level** value for the **Hold** parameter, you shift all levels of the envelope by the specified amount. This is much more convenient than shifting each level separately. You get a brighter sound if the operator is a modulator.

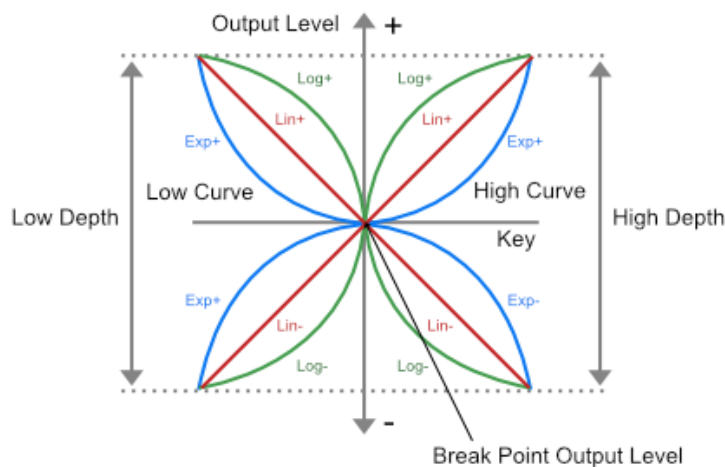
- To edit the envelope, drag the nodes in the editor.
- To enter a more precise value for the selected node, use the **Time** and **Level** value fields below the display.

In the value fields, you can enter numbers with up to two decimals. Note, however, that any editing you perform in the curve editor sets the values to integer values.

You can raise or lower the current value without losing the decimals by clicking in the value field and using the scroll wheel.

Level Scaling Parameters

The output of each operator can be scaled depending on the key played. The **Breakpoint** marks the key for which the output level remains unchanged. You can specify how the output level is to be raised or lowered for the keys above and below the **Breakpoint** by setting a **Depth** and a **Curve** for both key ranges.



Key Level Curve Low

Determines the level scaling curve for the keys below the **Breakpoint**. The available curve types are linear, exponential, and logarithmic.

Key Level Depth Low

Determines the depth of the level scaling curve for the keys below the **Breakpoint**.

Key Level Breakpoint

Determines the pivot point of the level scaling curve.

Key Level Depth High

Determines the depth of the level scaling curve for the keys above the **Breakpoint**.

Key Level Curve High

Determines the level scaling curve for the keys above the **Breakpoint**. The available curve types are linear, exponential, and logarithmic.

Envelope Controls



Time Key Follow

Determines how the total envelope time is affected by the note played.

- If this is set to 0, the envelope time does not change, regardless of the note played.
- With values above 0, high notes result in a shorter, and low notes in a longer envelope time.

Time Scale

Allows you to lengthen/shorten the overall envelope time.

This way, you do not have to edit each individual time segment to shorten or lengthen the envelope.

Time Scale is available as a modulation destination, which means that you can use a modulation source, such as **Velocity** or **MIDI controller**, for example, to control the overall envelope time.

Level Velocity Sensitivity

Determines how the output level of the operator is affected by the played velocity.

Pitch Envelope

In addition to the level envelope, each operator also provides a basic pitch envelope. This envelope can be used to create different pitch attacks for different operator chains, for example, to simulate a brass section, where not all players hit the final pitch at the same time.

Init Level

The level at which the envelope starts.

Attack Time

The time it takes to reach the **Attack Level**.

Attack Level

The level to which the envelope moves when a note is played.

Decay Time

The time it takes for the envelope to fall back to a neutral level, with no change in pitch.

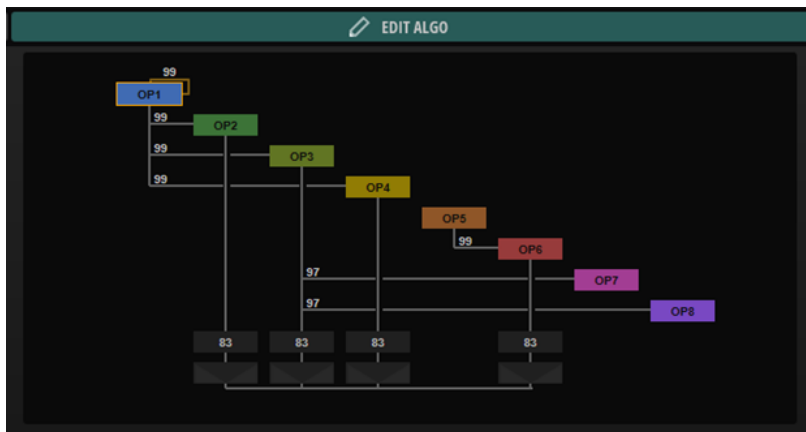
Algorithm Editor Page

This page contains the editor for the FM algorithm. Here, you can freely connect the eight available operators. You can build the classic DX7 and modern FMX algorithms, for example, but you can also create our own complex algorithms.

In the display on the left, a block diagram of the selected algorithm is shown.



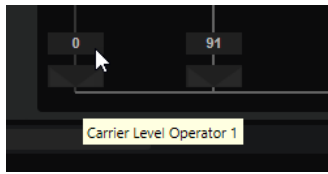
- To select a new algorithm preset, click **Select Preset** above the display.
- To select an operator, click on it in the display.
- To edit an operator, double-click it.
This opens the **Level** page for the operator.
- To activate/deactivate an operator, hold down **Shift**, and click an operator.
- To solo an operator, hold down **Ctrl/Cmd**, and click it or right-click it. If the operator is part of a chain, that is, if other modulators are connected directly or via a feedback connection, the entire chain is soloed.



On the right, the eight operators are shown in a diagonal line. Lines that connect operators above the diagonal line indicate feedback connections. Lines below the diagonal line indicate the modulations. At the bottom of the tab, two rows contain the **Output Level** and **Pan** controls for the carrier operators.

Carrier Outs and Pan

Each operator can send its output directly to the output of the FM oscillator and can therefore act as a carrier.

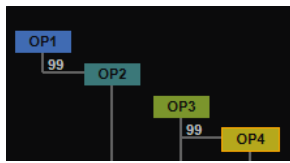


- To connect an operator to the output, move the mouse downwards to the bottom of the **Algorithm Editor**, so that the **Carrier Level** and **Carrier Pan** controls are shown. Click and drag or use the mouse wheel to set the level.
- You can use the **Carrier Pan** control to distribute different operators to different panorama positions of the stereo output of the FM zone.

Creating Modulations

Operators can modulate operators with higher numbers by sending an amount of their signal to them.

Modulations are represented by connecting lines between the two operators below the operator diagonal.



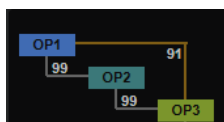
PROCEDURE

1. Position the mouse on the operator that you want to use as a modulator, and move it down until it reaches the row of the operator that you want to modulate.
The possible connections are indicated in the display.
 2. Click and drag to establish a modulation assignment, and set the modulation level.
 3. Optional: To edit the modulation level, either use the scroll wheel or double-click the value and enter a new value manually.
-

Creating Feedback Loops

An operator can send its output back to its own input or to the input of an operator that precedes it. These feedback loops can create signals with a rich frequency spectrum and can even be used to create sounds similar to white noise when used with high feedback levels.

Feedback connections are represented by lines between the operator blocks in the diagram.



PROCEDURE

1. Position the mouse on the source operator, and move it straight upwards. The line indicates to which destination operator the feedback is sent.

2. Click and drag the mouse upwards or downwards to establish the feedback connection and to set the gain.

The feedback gain can be set to negative or positive values.

If you feed the output of an operator back to itself, the following applies:

- Positive values produce harmonics and sound like a sawtooth wave.
- Negative values produce mainly odd harmonics and sound like a square wave.

If the feedback extends over multiple operators, the result is different and more complex.

NOTE

The global **Feedback** control below the algorithm selector on the left allows you to scale all feedback levels in the algorithm at the same time.

Creating Your Own Algorithms

You can create your own algorithms and save them as presets.

PROCEDURE

1. Start with a new algorithm, or load an algorithm that you want to modify.
 2. Create the modulations that you want to use.
 3. Create feedback loops between operators, or feed the output of an operator back to itself.
 4. To save your algorithm, click **Save Preset** in the global section on the left.
-

RESULT

The algorithm is saved in your user presets folder and is available on the **Preset** pop-up menu in the global section on the left.

Algorithm Finder Page

On this page, you can search for algorithms that match two criteria: the number of carriers and the number of operators that are connected in a chain. This allows you to filter the list of algorithms according to the type of sound that you want to create.

The vertical buttons allow you to specify the minimum number of operators connected in a chain, and the horizontal row of buttons determines the number of carriers. For example, to create a sound that uses three components, an attack, a sustain, and a transient part, set the number of **Carriers** to **3**, and select one of the suggested algorithms.



By default, the **Algorithm Finder** page lists all algorithms that use at least the specified number of operators/carriers. Algorithms with more operators/carriers are also shown.

- To show only algorithms with the set number of operators in a chain, activate **Exactly Match Number of Operators in Chain**.
- To show only algorithms with the set number of carriers, activate **Exactly Match Number of Carriers**.

Pitch Page

The **Pitch** page contains the pitch-related settings. In maximized view, it allows you to edit the pitch envelope.

Overview



Pitch

Determines the pitch of the sound.

Pitch Key Follow

Allows you to adjust the pitch modulation based on the MIDI note number. With this parameter set to a positive value, the higher you play, the more the pitch is raised. With the parameter set to a negative value, the higher you play, the lower the pitch. At a setting of +100%, the pitch follows the played note exactly.

Center Key

Specifies the MIDI note that is used as the central position for the **Pitch Key Follow** function.

Pitch Envelope Amount

Determines how much the pitch is affected by the pitch envelope. For example, if this parameter is set to 12, an envelope node can raise/lower the pitch by one octave.

Level Velocity

Determines how the velocity affects the level of the envelope.

The level of the envelope depends on two factors: the setting of this parameter and how hard you hit a key. With positive values, the harder you hit a key, the higher the level of the envelope. With negative values, the harder you hit a key, the lower the level of the envelope.

Time Scale

Allows you to lengthen/shorten the overall envelope time.

This way, you do not have to edit each individual time segment to shorten or lengthen the envelope.

Time Scale is available as a modulation destination, which means that you can use a modulation source, such as **Velocity** or **MIDI controller**, for example, to control the overall envelope time.

Time Key Follow

Determines how the total envelope time is affected by the note played.

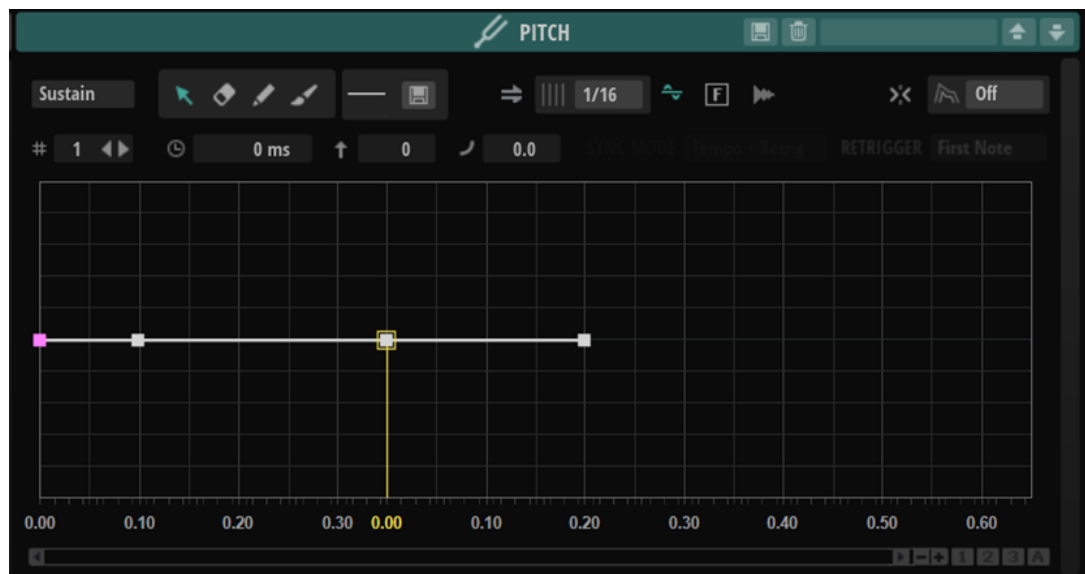
- If this is set to 0, the envelope time does not change, regardless of the note played.
- With values above 0, high notes result in a shorter, and low notes in a longer envelope time.

Time Velocity

Adjusts the influence of velocity on the phases of the envelope. Positive values decrease the length of the phases for higher velocity values. Negative values increase the length of the phases for higher velocity values.

Maximized View

In the maximized view, you can set up the pitch envelope to modulate the pitch over time.



Envelope Mode

- Select **Sustain** to play the envelope from the first node to the sustain node. The sustain level is held for as long as you play the note. When you release the note, the envelope continues with the stages following the sustain. This mode is ideal for looped samples.
- Select **Loop** to play back the envelope from the first node to the loop nodes. As a result, the loop is repeated for as long as you hold the key. When you release the note, the envelope continues playing the stages that follow the sustain. This mode is ideal for adding motion to the sustain of the envelope.
- Select **One Shot** to play the envelope from the first to the last node, even if you release the key. The envelope has no sustain stage. This mode is ideal for drum samples.
- Select **Sample Loop** to preserve the natural attack of the sample. The decay of the envelope does not start until the sample has reached the sample loop start. If you set the second node to the maximum level and use the subsequent nodes to shape the decay during the loop phase of the sample, the envelope only affects the loop phase. The attack of the envelope is still executed.
- Select **Shaper** to use the envelope as a modulator that allows you to create freely programmable cyclic modulations. To ensure a seamless cycle, the start and end node levels are linked.
 - The **Pitch** and **Filter** envelopes continue to be played in a loop after releasing notes, which makes it possible to use the modulation in the **Release** phase of a note.
 - The **Amp** envelope immediately stops playing when notes are released.

NOTE

The end node of the **Amp** envelope does not need to have a level of zero. However, when switching from **Shaper** mode to another mode, the end node level is set back to zero.

Edit

Allows you to edit single or multiple nodes.

Erase

Allows you to delete envelope nodes.

Draw

Allows you to insert a predefined envelope shape.

You can enter shapes by clicking or by clicking and dragging.

- Click once on the envelope display to insert the selected shape with its predefined length.

If **Sync to Host** is activated, the shape is inserted at the nearest grid position. If you repeatedly click at the same position, the shape is inserted multiple times.
- Click and drag to insert the shape in the covered drag area. If **Sync to Host** is activated, the start and the end nodes of the shape snap to the grid, and all nodes in between are scaled relative to the overall length of the shape.

After the shape is inserted, all nodes remain selected. This allows you to switch back to the **Edit** tool for further editing of the shape.

With **Fixed Mode** activated, the inserted nodes replace all nodes that cover the current time range. With **Fixed Mode** deactivated, all consecutive nodes are moved to the right.

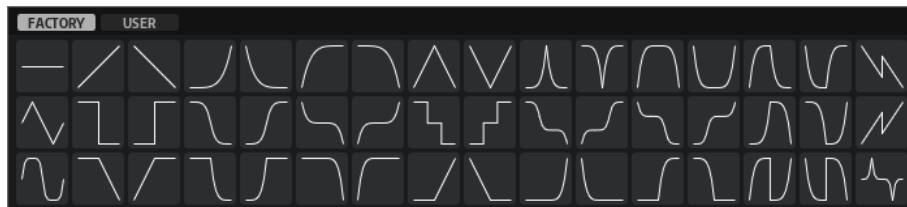
Paint

Allows you to paint in a predefined envelope shape. The shape is inserted with its predefined length.

If **Sync to Host** is activated, the length is quantized to the grid. The level of the shape is determined by the vertical mouse position. This allows you to draw perfectly tempo-synchronized, sequential shapes with an added overall level progression.

Select Shape

Allows you to select the shape that is used when entering nodes with the **Draw** or the **Paint** tool. A shape consists of multiple nodes making up a progression that can be used when creating your envelopes. The predefined factory shapes are available via the **Factory** tab. You can also create your own shapes and add them to the **User** tab. Up to 48 shapes are available per tab.



Save Shape

Allows you to save the current envelope shape as a user shape. You can add up to 48 user shapes.

Sync to Host Tempo

Allows you to synchronize the envelopes to the tempo of your host application.

Bipolar

The **Amp** and **Filter** envelopes are unipolar. This means that their value range for the level is 0% to +100%, and you can enter positive values only. The **Pitch** and **User** envelopes are bipolar. Their value range for the level is -100% to +100%, which allows you to enter negative and positive values for these envelopes.

- With **Bipolar** activated, you can use both positive and negative values.
- With **Bipolar** deactivated, the envelope is unipolar and exclusively uses positive values.

Fixed Mode

- With **Fixed Mode** activated, only the selected nodes are moved when you move a node on the time axis.
- With **Fixed Mode** deactivated, all subsequent nodes are moved as well when you move a node.

Show Waveform

Shows the sample waveform in the envelope editor.

Snap

If **Snap** is activated and you change the position of nodes, they snap to the nodes of the guide envelope that is shown in the background.

Guide Envelope

From this pop-up menu, you can select a second envelope to be displayed in the background of the edited envelope.

- If **Snap** is activated when you move nodes, they snap to the guide envelope.

Env Node

Displays the active envelope node. To select a node, enter its number in the field. To step through the nodes, use the **Previous Node/Next Node** buttons.

Time

Specifies the period of time between two nodes. Depending on the **Sync** mode, the **Time** parameter is displayed in milliseconds and seconds, or in fractions of beats.

NOTE

The fraction is always reduced to the smallest possible value. 2/16 is displayed as 1/8, for example.

Pitch

The pitch of the active node. To change the pitch, enter a new value in the field, or use the mouse wheel.

Curve

Allows you to adjust the curvature between two nodes from linear to logarithmic or exponential behavior.

RELATED LINKS

[Envelope Editing](#) on page 18

Envelope Editing

You can edit single nodes or multiple selected nodes.

Editing Nodes

- To add a node, double-click on the envelope curve.
- You can also add nodes by copying and pasting selected nodes.
When you press **Ctrl/Cmd**, the insert position is indicated by a line. With **Sync to Host Tempo** activated, this insert line is aligned to the note value grid.

NOTE

An envelope can consist of up to 512 nodes. If more nodes are copied to the clipboard than can be pasted into the envelope, a warning indicator lights up.

- To delete a node, double-click it, or click it with the **Erase** tool.

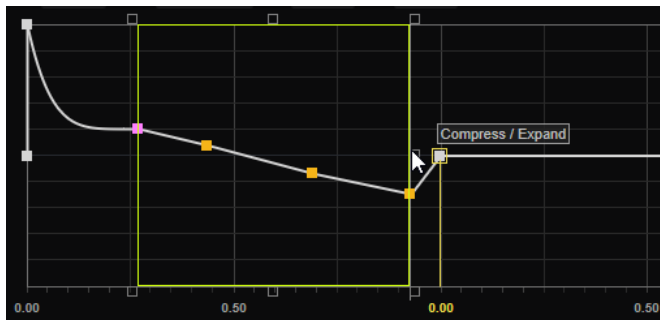
NOTE

- You cannot remove the first, the last, or the sustain node.
 - All nodes added after the sustain node affect the release phase of the envelope.
-
- To delete several nodes, drag a selection rectangle around them with the **Erase** tool.
With **Fixed Mode** activated, the positions of the remaining nodes are not modified. The **Time** value of the node to the right of the deleted selection is automatically adjusted.
With **Fixed Mode** deactivated, the remaining nodes are moved to the left to fill the gap.

- To change the curvature between two nodes, drag the curve segment up or down, or enter a new value in the **Curve** field.
Positive values change the curvature towards logarithmic, and negative values towards exponential behavior.
To reset a curve to linear, **Ctrl/Cmd**-click it.
- To move a node, drag it sideways, or enter a new value in the **Time** field.
For a higher resolution, hold **Shift** while moving the nodes.
To limit the movement to the time axis, that is, to change only the horizontal position of a node, hold down **Ctrl/Cmd** while dragging.
- To change the level of a node, drag it up or down, or enter a new value in the **Level** field.
For a higher resolution, hold **Shift** while moving the nodes.
To limit the movement to the level axis, that is, to change only the vertical position of a node, hold down **Alt/Opt** while dragging.

Multi Selection Editing with the Edit Tool

When multiple envelope nodes are selected and the **Edit** tool is active, a multi-selection rectangle is shown in the envelope display. It has six handles that allow you to modify the selected nodes.



- To compress the node levels, drag the right or left middle handle down.
- To expand the node levels, drag the right or left middle handle up.
- To tilt the left part of the node selection upwards or downwards, drag the upper left handle.
To use a shelving curve instead of a linear curve, press **Ctrl/Cmd**.
- To tilt the right part of the node selection upwards or downwards, drag the upper right handle.
To use a shelving curve instead of a linear curve, press **Ctrl/Cmd**.
- To scale the node levels, drag the upper middle handle.
To offset all nodes, press **Shift**. To use a bell curve instead of a linear curve, press **Ctrl/Cmd**.
- To scale the overall time of the selected nodes relative to the start node, drag the lower right handle.
- To scale the overall time of the selected nodes relative to the start node, drag the lower left handle.
- To move the time position of all selected nodes, drag the lower middle handle to the left or right.
To move the nodes in smaller steps, press **Shift**.
- To compress or expand the overall time of the selected nodes relative to the selection center, press **Ctrl/Cmd**, and drag the lower middle handle.
- To change the level and position of all selected nodes, drag one of the nodes.

Filter Page

The **Filter** page contains the filter-related settings. In maximized view, it allows you to edit the multi-stage filter envelope.

Overview



Filter Shape

- LP24, 18, 12, and 6 are low-pass filters with 24, 18, 12, and 6 dB/oct. Frequencies above the cutoff are attenuated.
- BP12 and BP24 are band-pass filters with 12 and 24 dB/oct. Frequencies below and above the cutoff are attenuated.
- HP6 + LP18 and HP6 + LP12 are a combination of a high-pass filter with 6 dB/oct and a low-pass filter with 18 and 12 dB/oct, respectively (asymmetric band-pass filter). Frequencies below and above the cutoff are attenuated. Attenuation is more pronounced for the frequencies above the cutoff.
- HP12 + LP6 and HP18 + LP6 are a combination of a high-pass filter with 12 and 18 dB/oct and a low-pass filter with 6 dB/oct (asymmetric band-pass filter). Frequencies below and above the cutoff are attenuated. Attenuation is more pronounced for the frequencies below the cutoff.
- HP24, 18, 12, and 6 are high-pass filters with 24, 18, 12, and 6 dB/oct. Frequencies below the cutoff are attenuated.
- BR12 and BR24 are band-reject filters with 12 and 24 dB/oct. Frequencies around the cutoff are attenuated.
- BR12 + LP6 and BR12 + LP12 are a combination of a band-reject filter with 12 dB/oct and a low-pass filter with 6 and 12 dB/oct, respectively. Frequencies around and above the cutoff are attenuated.
- BP12 + BR12 is a band-pass filter with 12 dB/oct plus a band-reject filter with 12 dB/oct. Frequencies below, above, and around the cutoff are attenuated.
- HP6 + BR12 and HP12 + BR12 are a combination of a high-pass filter with 6 and 12 dB/oct and a band-reject filter with 12 dB/oct. Frequencies below and around the cutoff are attenuated.
- AP is an all-pass filter with 18 dB/oct. Frequencies around the cutoff are attenuated.
- AP + LP6 is an all-pass filter with 18 dB/oct plus a low-pass filter with 6 dB/oct. Frequencies around and above the cutoff are attenuated.

- HP6 + AP is a high-pass filter with 6 dB/oct plus an all-pass filter with 18 dB/oct. Frequencies around and below the cutoff are attenuated.

Resonance

Emphasizes the frequencies around the cutoff. At higher settings, the filter self-oscillates, which results in a ringing tone.

Cutoff

Controls the cutoff frequency of the filter.

Distortion

Adds distortion to the signal. The following distortion types are available:

- **Tube** adds warm, tube-like distortion.
- **Hard Clip** adds bright, transistor-like distortion.
- **Bit Reduction** adds digital distortion by means of quantization noise.
- **Rate Reduction** adds digital distortion by means of aliasing.
- **Rate Reduction Key Follow** adds digital distortion by means of aliasing, but with **Key Follow**. The rate reduction follows the keyboard, so the higher you play, the higher the sample rate.

Cutoff Key Follow

Adjusts the cutoff modulation using the note number. Increase this parameter to raise the cutoff with higher notes. At 100%, the cutoff follows the played pitch exactly.

Center Key

Specifies the MIDI note that is used as the center position for **Cutoff Key Follow**.

Envelope Amount

Controls the cutoff modulation from the filter envelope.

Cutoff Velocity

Controls the cutoff modulation from velocity.

Time Scale

Allows you to lengthen/shorten the overall envelope time.

This way, you do not have to edit each individual time segment to shorten or lengthen the envelope.

Time Scale is available as a modulation destination, which means that you can use a modulation source, such as **Velocity** or **MIDI controller**, for example, to control the overall envelope time.

Time Velocity

Adjusts the influence of velocity on the phases of the envelope. Positive values decrease the length of the phases for higher velocity values. Negative values increase the length of the phases for higher velocity values.

Time Key Follow

Determines how the total envelope time is affected by the note played.

- If this is set to 0, the envelope time does not change, regardless of the note played.
- With values above 0, high notes result in a shorter, and low notes in a longer envelope time.

Maximized View

In the maximized view, you can set up the filter envelope to modulate the filter over time.



Toolbar

Envelope Mode

- Select **Sustain** to play the envelope from the first node to the sustain node. The sustain level is held for as long as you play the note. When you release the note, the envelope continues with the stages following the sustain. This mode is ideal for looped samples.
- Select **Loop** to play back the envelope from the first node to the loop nodes. As a result, the loop is repeated for as long as you hold the key. When you release the note, the envelope continues playing the stages that follow the sustain. This mode is ideal for adding motion to the sustain of the envelope.
- Select **One Shot** to play the envelope from the first to the last node, even if you release the key. The envelope has no sustain stage. This mode is ideal for drum samples.
- Select **Sample Loop** to preserve the natural attack of the sample. The decay of the envelope does not start until the sample has reached the sample loop start. If you set the second node to the maximum level and use the subsequent nodes to shape the decay during the loop phase of the sample, the envelope only affects the loop phase. The attack of the envelope is still executed.
- Select **Shaper** to use the envelope as a modulator that allows you to create freely programmable cyclic modulations. To ensure a seamless cycle, the start and end node levels are linked.
 - The **Pitch** and **Filter** envelopes continue to be played in a loop after releasing notes, which makes it possible to use the modulation in the **Release** phase of a note.
 - The **Amp** envelope immediately stops playing when notes are released.

NOTE

The end node of the **Amp** envelope does not need to have a level of zero. However, when switching from **Shaper** mode to another mode, the end node level is set back to zero.

Edit

Allows you to edit single or multiple nodes.

Erase

Allows you to delete envelope nodes.

Draw

Allows you to insert a predefined envelope shape.

You can enter shapes by clicking or by clicking and dragging.

- Click once on the envelope display to insert the selected shape with its predefined length.

If **Sync to Host** is activated, the shape is inserted at the nearest grid position. If you repeatedly click at the same position, the shape is inserted multiple times.

- Click and drag to insert the shape in the covered drag area. If **Sync to Host** is activated, the start and the end nodes of the shape snap to the grid, and all nodes in between are scaled relative to the overall length of the shape.

After the shape is inserted, all nodes remain selected. This allows you to switch back to the **Edit** tool for further editing of the shape.

With **Fixed Mode** activated, the inserted nodes replace all nodes that cover the current time range. With **Fixed Mode** deactivated, all consecutive nodes are moved to the right.

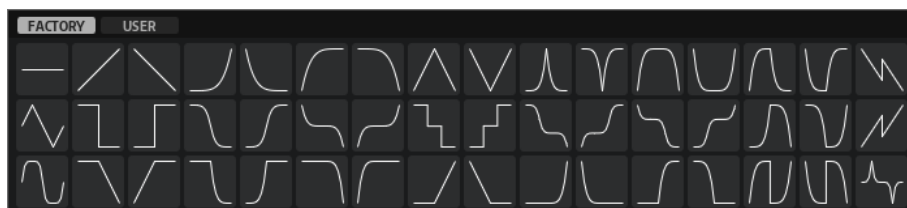
Paint

Allows you to paint in a predefined envelope shape. The shape is inserted with its predefined length.

If **Sync to Host** is activated, the length is quantized to the grid. The level of the shape is determined by the vertical mouse position. This allows you to draw perfectly tempo-synchronized, sequential shapes with an added overall level progression.

Select Shape

Allows you to select the shape that is used when entering nodes with the **Draw** or the **Paint** tool. A shape consists of multiple nodes making up a progression that can be used when creating your envelopes. The predefined factory shapes are available via the **Factory** tab. You can also create your own shapes and add them to the **User** tab. Up to 48 shapes are available per tab.



Save Shape

Allows you to save the current envelope shape as a user shape. You can add up to 48 user shapes.

Sync to Host Tempo

Allows you to synchronize the envelopes to the tempo of your host application.

Fixed Mode

- With **Fixed Mode** activated, only the selected nodes are moved when you move a node on the time axis.

- With **Fixed Mode** deactivated, all subsequent nodes are moved as well when you move a node.

Show Waveform

Shows the sample waveform in the envelope editor.

Snap

If **Snap** is activated and you change the position of nodes, they snap to the nodes of the guide envelope that is shown in the background.

Guide Envelope

From this pop-up menu, you can select a second envelope to be displayed in the background of the edited envelope.

- If **Snap** is activated when you move nodes, they snap to the guide envelope.

Env Node

Displays the active envelope node. To select a node, enter its number in the field. To step through the nodes, use the **Previous Node/Next Node** buttons.

Time

Specifies the period of time between two nodes. Depending on the **Sync** mode, the **Time** parameter is displayed in milliseconds and seconds, or in fractions of beats.

NOTE

The fraction is always reduced to the smallest possible value. $2/16$ is displayed as $1/8$, for example.

Level

Specifies the amplitude of the envelope at the position set by the **Time** parameter.

Curve

Allows you to adjust the curvature between two nodes from linear to logarithmic or exponential behavior.

RELATED LINKS

[Envelope Editing](#) on page 24

Envelope Editing

You can edit single nodes or multiple selected nodes.

Editing Nodes

- To add a node, double-click on the envelope curve.
- You can also add nodes by copying and pasting selected nodes.

When you press **Ctrl/Cmd**, the insert position is indicated by a line. With **Sync to Host Tempo** activated, this insert line is aligned to the note value grid.

NOTE

An envelope can consist of up to 512 nodes. If more nodes are copied to the clipboard than can be pasted into the envelope, a warning indicator lights up.

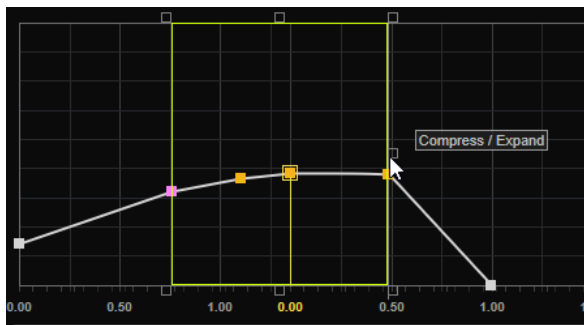
- To delete a node, double-click it, or click it with the **Erase** tool.

NOTE

- You cannot remove the first, the last, or the sustain node.
 - All nodes added after the sustain node affect the release phase of the envelope.
-
- To delete several nodes, drag a selection rectangle around them with the **Erase** tool.
With **Fixed Mode** activated, the positions of the remaining nodes are not modified. The **Time** value of the node to the right of the deleted selection is automatically adjusted.
With **Fixed Mode** deactivated, the remaining nodes are moved to the left to fill the gap.
 - To change the curvature between two nodes, drag the curve segment up or down, or enter a new value in the **Curve** field.
Positive values change the curvature towards logarithmic, and negative values towards exponential behavior.
To reset a curve to linear, **Ctrl/Cmd**-click it.
 - To move a node, drag it sideways, or enter a new value in the **Time** field.
For a higher resolution, hold **Shift** while moving the nodes.
To limit the movement to the time axis, that is, to change only the horizontal position of a node, hold down **Ctrl/Cmd** while dragging.
 - To change the level of a node, drag it up or down, or enter a new value in the **Level** field.
For a higher resolution, hold **Shift** while moving the nodes.
To limit the movement to the level axis, that is, to change only the vertical position of a node, hold down **Alt/Opt** while dragging.

Multi Selection Editing with the Edit Tool

When multiple envelope nodes are selected and the **Edit** tool is active, a multi-selection rectangle is shown in the envelope display. It has six handles that allow you to modify the selected nodes.



- To compress the node levels, drag the right or left middle handle down.
- To expand the node levels, drag the right or left middle handle up.
- To tilt the left part of the node selection upwards or downwards, drag the upper left handle.
To use a shelving curve instead of a linear curve, press **Ctrl/Cmd**.
- To tilt the right part of the node selection upwards or downwards, drag the upper right handle.
To use a shelving curve instead of a linear curve, press **Ctrl/Cmd**.
- To scale the node levels, drag the upper middle handle.
To offset all nodes, press **Shift**. To use a bell curve instead of a linear curve, press **Ctrl/Cmd**.
- To scale the overall time of the selected nodes relative to the start node, drag the lower right handle.

- To scale the overall time of the selected nodes relative to the start node, drag the lower left handle.
- To move the time position of all selected nodes, drag the lower middle handle to the left or right.
To move the nodes in smaller steps, press **Shift**.
- To compress or expand the overall time of the selected nodes relative to the selection center, press **Ctrl/Cmd**, and drag the lower middle handle.
- To change the level and position of all selected nodes, drag one of the nodes.

Amp Page

The **Amp** page contains the amplifier settings. In maximized view, it allows you to edit the amplifier envelope.



Overview

Level

Specifies the level of the sound.

Pan

Determines the position of the sound in the stereo panorama. At a setting of -100%, the sound is panned hard left, and at +100%, it is panned hard right.

Pan Key Follow

Allows you to adjust the pan modulation via the MIDI note number. Set this parameter to positive values to offset the pan position towards the right for notes above, and towards the left for notes below the center key. Use negative values to offset the pan position towards the left for notes above, and towards the right for notes below the center key.

At the maximum setting of +200%, the pan position moves from hard left to hard right within two octaves: Fully left is reached one octave below, and fully right is reached one octave above the center key.

Center Key

Specifies the MIDI note that is used as the center position for **Pan Key Follow**.

Level Key Follow

Allows you to control the volume depending on the note pitch. Positive values mean that, the higher the notes you play, the more the volume is raised. With negative values, higher notes result in lower volume.

Center Key

Specifies the MIDI note that is used as the center position for **Level Key Follow**.

Level Velocity

Determines how the velocity affects the level of the envelope.

The level of the envelope depends on two factors: the setting of this parameter and how hard you hit a key. With positive values, the harder you hit a key, the higher the level of the envelope. With negative values, the harder you hit a key, the lower the level of the envelope.

Use Amp Envelope Release

If **Use Amp Env Release** is deactivated, the following applies:

- Carriers with a **Release Level** set to 0 stop playing once the level envelope reaches the end of its release. The last carrier that ends stops the voice.
- Carriers with a **Release Level** above 0 continue playing on that level.

NOTE

In this mode, the release segment of the amp envelope of the zone is deactivated and cannot be edited. Only the **Polyphony** setting of the layer limits the number of voices that can be played at the same time.

If **Use Amp Env Release** is activated, the following applies:

- Carriers with a **Release Level** set to 0 stop playing once the level envelope reaches the end of its release. However, the voice continues to play until the end of the release of the amp envelope.
- Carriers with a **Release Level** above 0 continue playing on that level. The release time and the end of voice are determined by the amp envelope.

NOTE

The release of a carrier may not be played in its entirety if the amp envelope release is shorter. If the amp envelope release is longer, a voice may still be active even though all carriers have reached a release level of 0.

Time Scale

Allows you to lengthen/shorten the overall envelope time.

This way, you do not have to edit each individual time segment to shorten or lengthen the envelope.

Time Scale is available as a modulation destination, which means that you can use a modulation source, such as **Velocity** or **MIDI controller**, for example, to control the overall envelope time.

Time Velocity

Adjusts the influence of velocity on the phases of the envelope. Positive values decrease the length of the phases for higher velocity values. Negative values increase the length of the phases for higher velocity values.

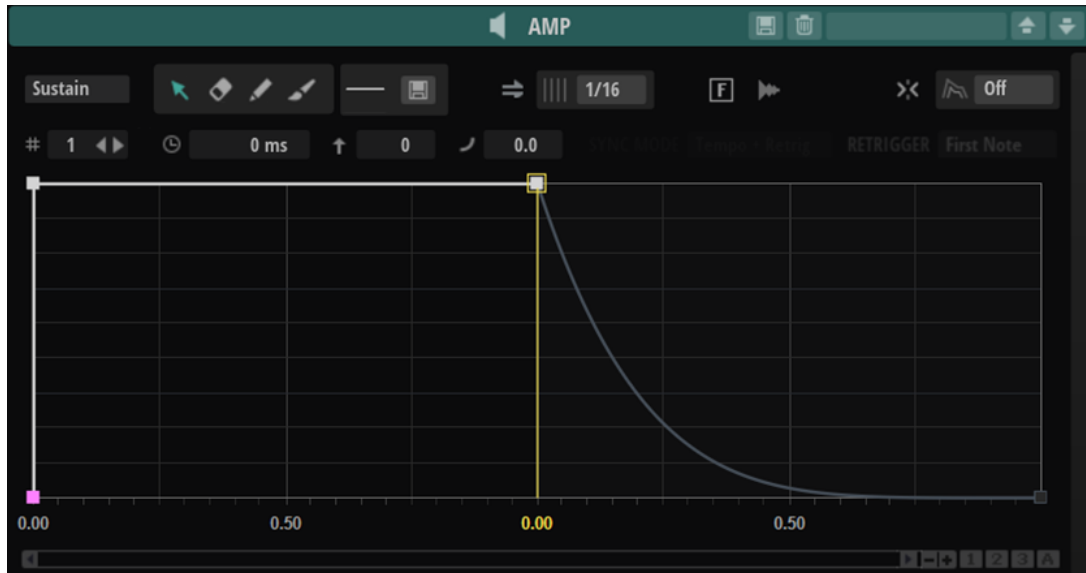
Time Key Follow

Determines how the total envelope time is affected by the note played.

- If this is set to 0, the envelope time does not change, regardless of the note played.
- With values above 0, high notes result in a shorter, and low notes in a longer envelope time.

Maximized View

In the maximized view, you can set up the amp envelope, to modulate the level over time.



Envelope Mode

- Select **Sustain** to play the envelope from the first node to the sustain node. The sustain level is held for as long as you play the note. When you release the note, the envelope continues with the stages following the sustain. This mode is ideal for looped samples.
- Select **Loop** to play back the envelope from the first node to the loop nodes. As a result, the loop is repeated for as long as you hold the key. When you release the note, the envelope continues playing the stages that follow the sustain. This mode is ideal for adding motion to the sustain of the envelope.
- Select **One Shot** to play the envelope from the first to the last node, even if you release the key. The envelope has no sustain stage. This mode is ideal for drum samples.
- Select **Sample Loop** to preserve the natural attack of the sample. The decay of the envelope does not start until the sample has reached the sample loop start. If you set the second node to the maximum level and use the subsequent nodes to shape the decay during the loop phase of the sample, the envelope only affects the loop phase. The attack of the envelope is still executed.
- Select **Shaper** to use the envelope as a modulator that allows you to create freely programmable cyclic modulations. To ensure a seamless cycle, the start and end node levels are linked.
 - The **Pitch** and **Filter** envelopes continue to be played in a loop after releasing notes, which makes it possible to use the modulation in the **Release** phase of a note.
 - The **Amp** envelope immediately stops playing when notes are released.

NOTE

The end node of the **Amp** envelope does not need to have a level of zero. However, when switching from **Shaper** mode to another mode, the end node level is set back to zero.

Edit

Allows you to edit single or multiple nodes.

Erase

Allows you to delete envelope nodes.

Draw

Allows you to insert a predefined envelope shape.

You can enter shapes by clicking or by clicking and dragging.

- Click once on the envelope display to insert the selected shape with its predefined length.
If **Sync to Host** is activated, the shape is inserted at the nearest grid position. If you repeatedly click at the same position, the shape is inserted multiple times.
- Click and drag to insert the shape in the covered drag area. If **Sync to Host** is activated, the start and the end nodes of the shape snap to the grid, and all nodes in between are scaled relative to the overall length of the shape.
After the shape is inserted, all nodes remain selected. This allows you to switch back to the **Edit** tool for further editing of the shape.

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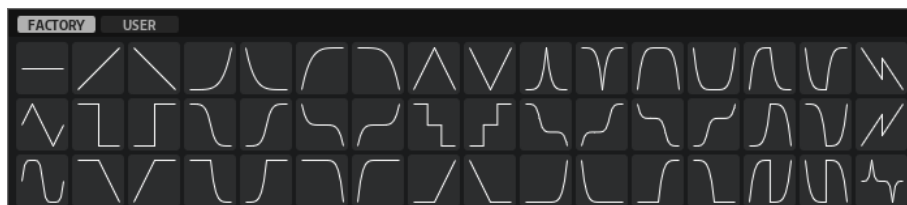
Paint

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Select Shape

Allows you to select the shape that is used when entering nodes with the **Draw** or the **Paint** tool. A shape consists of multiple nodes making up a progression that can be used when creating your envelopes. The predefined factory shapes are available via the **Factory** tab. You can also create your own shapes and add them to the **User** tab. Up to 48 shapes are available per tab.



Save Shape

Allows you to save the current envelope shape as a user shape. You can add up to 48 user shapes.

Sync to Host Tempo

Allows you to synchronize the envelopes to the tempo of your host application.

Fixed Mode

- With **Fixed Mode** activated, only the selected nodes are moved when you move a node on the time axis.
- With **Fixed Mode** deactivated, all subsequent nodes are moved as well when you move a node.

Show Waveform

Shows the sample waveform in the envelope editor.

Snap

If **Snap** is activated and you change the position of nodes, they snap to the nodes of the guide envelope that is shown in the background.

Guide Envelope

From this pop-up menu, you can select a second envelope to be displayed in the background of the edited envelope.

- If **Snap** is activated when you move nodes, they snap to the guide envelope.

Env Node

Displays the active envelope node. To select a node, enter its number in the field. To step through the nodes, use the **Previous Node/Next Node** buttons.

Time

Specifies the period of time between two nodes. Depending on the **Sync** mode, the **Time** parameter is displayed in milliseconds and seconds, or in fractions of beats.

NOTE

The fraction is always reduced to the smallest possible value. $2/16$ is displayed as $1/8$, for example.

Level

Specifies the amplitude of the envelope at the position set by the **Time** parameter.

Curve

Allows you to adjust the curvature between two nodes from linear to logarithmic or exponential behavior.

RELATED LINKS

[Envelope Editing](#) on page 24

Envelope Editing

You can edit single nodes or multiple selected nodes.

Editing Nodes

- To add a node, double-click on the envelope curve.
- You can also add nodes by copying and pasting selected nodes.
When you press **Ctrl/Cmd**, the insert position is indicated by a line. With **Sync to Host Tempo** activated, this insert line is aligned to the note value grid.

NOTE

An envelope can consist of up to 512 nodes. If more nodes are copied to the clipboard than can be pasted into the envelope, a warning indicator lights up.

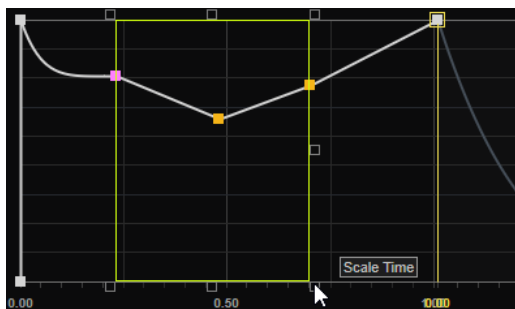
- To delete a node, double-click it, or click it with the **Erase** tool.

NOTE

- You cannot remove the first, the last, or the sustain node.
- All nodes added after the sustain node affect the release phase of the envelope.
- To delete several nodes, drag a selection rectangle around them with the **Erase** tool. With **Fixed Mode** activated, the positions of the remaining nodes are not modified. The **Time** value of the node to the right of the deleted selection is automatically adjusted. With **Fixed Mode** deactivated, the remaining nodes are moved to the left to fill the gap.
- To change the curvature between two nodes, drag the curve segment up or down, or enter a new value in the **Curve** field. Positive values change the curvature towards logarithmic, and negative values towards exponential behavior. To reset a curve to linear, **Ctrl/Cmd**-click it.
- To move a node, drag it sideways, or enter a new value in the **Time** field. For a higher resolution, hold **Shift** while moving the nodes. To limit the movement to the time axis, that is, to change only the horizontal position of a node, hold down **Ctrl/Cmd** while dragging.
- To change the level of a node, drag it up or down, or enter a new value in the **Level** field. For a higher resolution, hold **Shift** while moving the nodes. To limit the movement to the level axis, that is, to change only the vertical position of a node, hold down **Alt/Opt** while dragging.

Multi Selection Editing with the Edit Tool

When multiple envelope nodes are selected and the **Edit** tool is active, a multi-selection rectangle is shown in the envelope display. It has six handles that allow you to modify the selected nodes.



- To compress the node levels, drag the right or left middle handle down.
- To expand the node levels, drag the right or left middle handle up.
- To tilt the left part of the node selection upwards or downwards, drag the upper left handle. To use a shelving curve instead of a linear curve, press **Ctrl/Cmd**.
- To tilt the right part of the node selection upwards or downwards, drag the upper right handle. To use a shelving curve instead of a linear curve, press **Ctrl/Cmd**.

- To scale the node levels, drag the upper middle handle.
To offset all nodes, press **Shift**. To use a bell curve instead of a linear curve, press **Ctrl/Cmd**.
- To scale the overall time of the selected nodes relative to the start node, drag the lower right handle.
- To scale the overall time of the selected nodes relative to the start node, drag the lower left handle.
- To move the time position of all selected nodes, drag the lower middle handle to the left or right.
To move the nodes in smaller steps, press **Shift**.
- To compress or expand the overall time of the selected nodes relative to the selection center, press **Ctrl/Cmd**, and drag the lower middle handle.
- To change the level and position of all selected nodes, drag one of the nodes.

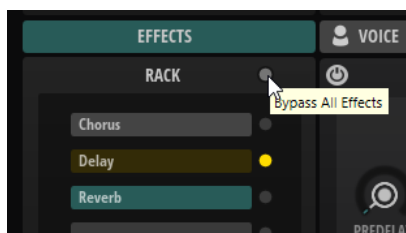
Effects Section

In the **Effects** section, you can connect up to five effect modules in series.

The instrument comes with a collection of high-quality effects. The effects are sorted into the following categories: **Modulation**, **EQ/Filter**, **Dynamics**, **Distortion**, **Pan**, and **Time**.



- To load an effect, move the mouse over the slot until the **Select Effect** icon is shown, click it, and navigate to the effect that you want to add.
- To change the order of the effects, use drag and drop.
- To edit the parameters for an effect, select it, so that its parameters are shown on the right.
- To bypass a single effect in the chain, activate its **Bypass Effect** button.
- To bypass the entire **Effects** section, activate **Bypass All Effects**.

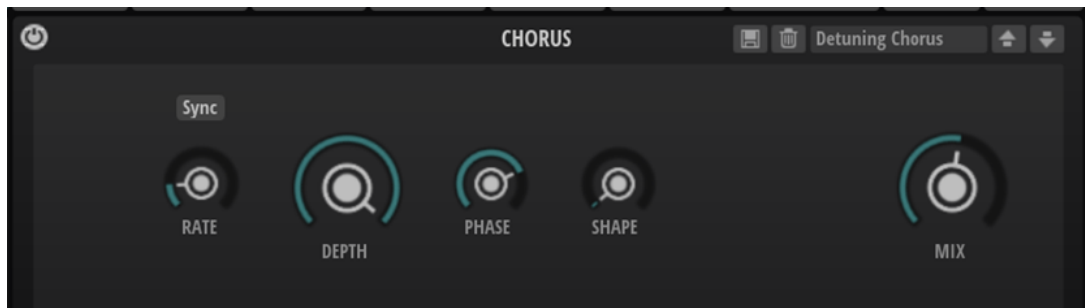


Modulation Effects

The **Modulation** submenu contains the modulation effects.

Chorus

Chorus thickens and broadens the sound by means of pitch modulation.



Rate

Allows you to specify the frequency of the pitch modulation in Hertz.

Sync

Allows you to set the **Rate** value in fractions of beats.

Depth

Sets the intensity of the pitch modulation.

Phase

Widens the sound image of the effect from mono to stereo.

Shape

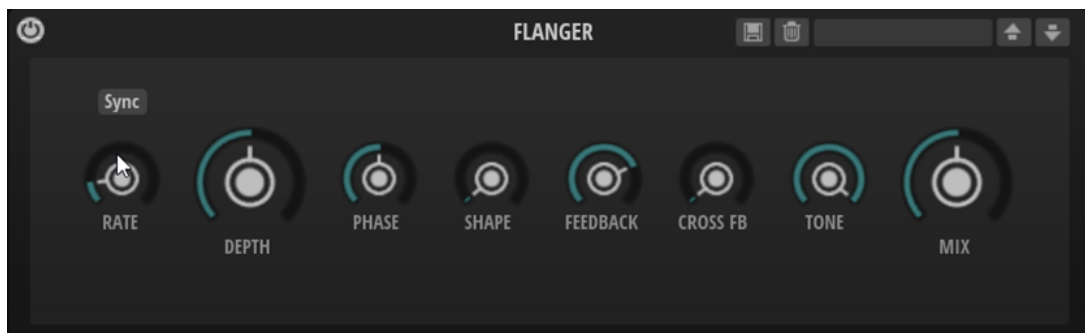
Adjusts the characteristics of the modulation. With a setting of 0%, the pitch changes continuously, producing a steady modulation. With a setting of 100%, the pitch does not change all the time, producing a less steady modulation.

Mix

Sets the ratio between the dry and the wet signal.

Flanger

Flanger thickens and broadens the sound by means of pitch modulation.



Rate

Allows you to specify the frequency of the pitch modulation in Hertz.

Depth

Sets the intensity of the pitch modulation.

Phase

Widens the sound image of the effect from mono to stereo. This parameter also changes the characteristics of the **Cross FB** parameter.

Shape

Adjusts the characteristics of the modulation. This is particularly noticeable when **Feedback** is activated. With a setting of 0%, the sound sweeps linearly up and down. With a setting of 100%, the sound sweeps exponentially up and down.

Feedback

Adds resonances to the effect. This allows for jet-like sweeps of the sound.

Cross FB

Mixes the feedback of the left channel with the right channel, and vice versa. The effect of this parameter is influenced by the **Phase** parameter.

NOTE

This parameter only takes effect if the **Feedback** parameter is set to a value above 0%.

Tone

Adjusts the tone color of the feedback. At lower values, the feedback is less bright.

Mix

Sets the ratio between the dry and the wet signal.

Phaser

Phaser thickens and broadens the sound by means of phase modulation.



Rate

Specifies the frequency of the phase modulation.

Sync

Allows you to set the **Rate** value in fractions of beats.

Depth

Sets the intensity of the phase modulation.

Phase

Widens the sound image of the effect from mono to stereo.

Shift

Shifts the phase modulation upwards to higher frequencies of the spectrum.

Feedback

Adds resonances to the effect. Higher settings produce a more pronounced effect.

Low Cut

Attenuates the low frequencies.

High Cut

Attenuates the high frequencies.

Mix

Sets the ratio between the dry and the wet signal.

Ring Modulator

Ring Modulator provides a sine oscillator that is multiplied with the input signal. This creates metallic, or bell-like, frequencies.



LFO Waveform and Shape

Waveform selects the basic type of waveform. **Shape** changes the characteristics of the waveform.

- **Sine** produces smooth modulation. **Shape** adds additional harmonics to the waveform.
- **Triangle** is similar to **Sine**. **Shape** continuously changes the triangle waveform to a trapezoid.
- **Saw** produces a ramp cycle. **Shape** continuously changes the waveform from ramp down to triangle to ramp up.
- **Pulse** produces stepped modulation, where the modulation switches abruptly between two values. **Shape** continuously changes the ratio between the high and low state of the waveform. If **Shape** is set to 50%, a square wave is produced.
- **Ramp** is similar to the **Saw** waveform. **Shape** adds a gradually increasing amount of silence before the sawtooth ramp up begins.
- **Log** produces a logarithmic modulation. **Shape** continuously changes the logarithmic curvature from negative to positive.
- **S & H 1** produces random stepped modulation, where each step is different. **Shape** puts ramps between the steps and changes the **S & H** into a smooth random signal, with the control set fully to the right.
- **S & H 2** is similar to **S & H 1**. The steps alternate between random high and low values. **Shape** puts ramps between the steps and changes the **S & H** into a smooth random signal, with the control set fully to the right.

LFO Freq

Allows you to specify the frequency of the LFO for modulating the frequency of the sine oscillator.

Sync

Allows you to set the **LFO Freq** value in fractions of beats.

LFO Depth

Sets the intensity of the LFO modulation of the sine oscillator frequency.

Sine Frequency

Determines the frequency of the sine oscillator.

Mix

Sets the ratio between the dry and the wet signal.

Frequency Shifter

A frequency shifter shifts each frequency of the input signal by a fixed amount.



Unlike pitch shifters, which shift the frequencies by a factor, maintaining the harmonic relations, a frequency shifter alters the harmonic relations. Therefore, a larger frequency shift usually results in a disharmonic sound. Furthermore, a frequency shifter alters the frequencies by adding an offset, while a pitch shifter multiplies the frequencies by a factor. The frequency shifter alters lower frequencies more than higher frequencies. For example, if the input signal has the frequencies 100 Hz, 1000 Hz, and 10000 Hz and you shift the frequency by +100 Hz, the resulting frequencies are 200 Hz, 1100 Hz, and 10100 Hz.

Freq Coarse

Sets the amount of frequency shift.

Freq Fine

Allows you to fine-tune the amount of frequency shift.

L/R Coarse

Sets an offset for the left and right channels.

- Positive values shift the right channel upwards and the left channel downwards.
- Negative values shift the left channel upwards and the right channel downwards.

L/R Fine

Allows you to fine-tune the offset between the left and right channels.

- Positive values shift the right channel upwards and the left channel downwards.
- Negative values shift the left channel upwards and the right channel downwards.

Feedback

Sets the amount of feedback, that is, the amount of signal that is sent from the output of the effect back to its input. The sound is similar to that of a phaser. You can control the direction and the speed of this effect with the **Freq Fine** parameter.

Mix

Sets the ratio between the dry and the wet signal.

Step Flanger

Step Flanger expands the Flanger with a “sample and hold” section that divides the modulation signal into a definable number of steps.



Rate

Allows you to specify the frequency of the pitch modulation in Hertz.

Sync

Allows you to set the **Rate** value in fractions of beats.

Depth

Sets the intensity of the pitch modulation.

Phase

Widens the sound image of the effect from mono to stereo. This parameter also changes the characteristics of the **Cross FB** parameter.

Shape

Adjusts the characteristics of the modulation. This is particularly noticeable when **Feedback** is activated. With a setting of 0%, the sound sweeps linearly up and down. With a setting of 100%, the sound sweeps exponentially up and down.

Feedback

Adds resonances to the effect. This allows for jet-like sweeps of the sound.

Cross FB

Mixes the feedback of the left channel with the right channel, and vice versa. The effect of this parameter is influenced by the **Phase** parameter.

NOTE

This parameter only takes effect if the **Feedback** parameter is set to a value above 0%.

Long/Short

Defines the length of the delay line that is modulated. **Short** produces a sharper flanger effect, and **Long** produces a less defined, more blurred flanger sound.

Steps

Determines into how many steps the modulation signal is divided. You can use up to 32 steps.

S&H Mix

Blends the normal modulation signal with the stepped modulation signal. At 100%, only the stepped modulation is used.

Smooth

Creates ramps between the steps. This way, the stepped modulation signal sounds smoother.

Tone

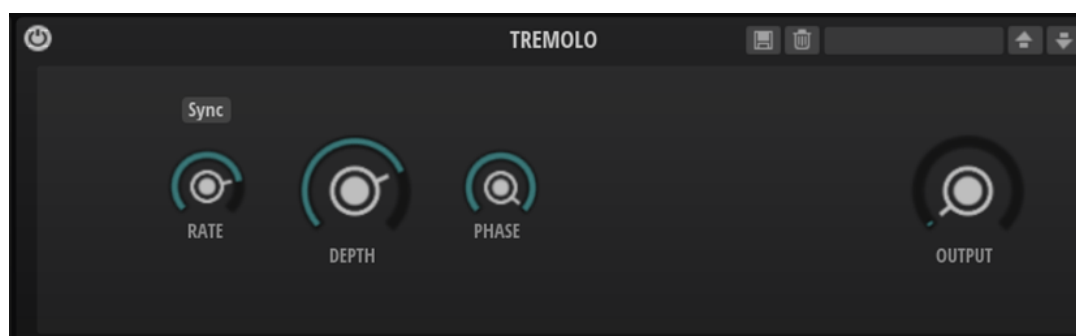
Adjusts the tone color of the feedback. At lower values, the feedback is less bright.

Mix

Sets the ratio between the dry and the wet signal.

Tremolo

Tremolo produces amplitude modulation, that is, cyclic modulation of the level of the sound.



Rate

Determines the frequency of the amplitude modulation.

Sync

Allows you to set the **Rate** value in fractions of beats.

Depth

Sets the intensity of the amplitude modulation.

Phase

Widens the sound image of the effect from mono to stereo.

Output

Sets the output level of the effect.

Rotary

Rotary emulates the sound of a vintage rotary speaker including amplifier, horn, drum, and cabinet.

By emitting the sound via a rotating horn and drum, the rotary speaker produces a Doppler effect that thickens the sound. The horn and drum rotate at variable speeds, producing different amounts of the Doppler effect. The amplifier of the rotary speaker adds a warm sounding distortion, and the horn, drum, and cabinet color the sound in a unique way. The horn and drum are recorded via (virtual) microphones that can be set to different angles to broaden the sound image. Typically, rotary speakers are used with electric organs.



Rotation Speed

Changes the rotation speed of the horn and drum. When set to **Fast**, the Doppler effect is stronger. When set to **Stop**, there is no Doppler effect because the drum and horn do not rotate. Because the horn and drum accelerate and decelerate at different speeds, the transition from **Slow** to **Fast** and vice versa generates highly interesting sounds.

Distance

Sets the distance between the microphones and the horn and drum. The amplitude modulation of the sound decreases with the distance of the microphones. Set this to higher values for less amplitude modulation.

Cabinet

The horn and drum sound different when recorded through the louvers of the cabinet. Use this parameter to color the horn and drum with the sound of the cabinet. With a setting of 100%, you obtain the full sound of the cabinet.

Balance

Adjusts the balance between the horn and drum microphones. With a setting of 0%, you hear only the drum. With a setting of 100%, you hear only the horn.

Slow

Adjusts the slow speed of the horn and drum at the same time.

Fast

Adjusts the fast speed of the horn and drum at the same time.

Accel

Adjusts the acceleration time for raising and lowering the rotation speed of the horn and drum.

Horn Mic Angle

Adjusts the stereo spread of the horn microphones. With a setting of 0°, the sound image is mono. With a setting of 180°, the sound image is fully stereo.

Drum Mic Angle

Adjusts the stereo spread of the drum microphones. With a setting of 0°, the sound image is mono. With a setting of 180°, the sound image is fully stereo.

Input

Adjusts the gain before the rotary and drive.

Drive

Adjusts the distortion of the amplifier.

Output

Adjusts the gain after the rotary and drive.

Color

Alters the sound of the Rotary effect by changing the timbre, which leads to the rotation of the horn and the drum being perceived with greater depth.

Bass

Adjusts the tone color of the low frequencies.

Treble

Adjusts the tone color of the high frequencies.

Vibrato

Vibrato emulates the chorus and vibrato effects of vintage organs. It thickens the sound by means of pitch modulation.

Custom Tab



Rate

Sets the frequency of the pitch modulation.

Depth

Sets the intensity of the pitch modulation.

Vibr/Chor

Controls the mix between the vibrato and the chorus signal. At 100%, you only hear the chorus effect.

Classic Tab

The **Classic** tab allows you to choose from several predefined chorus and vibrato settings.

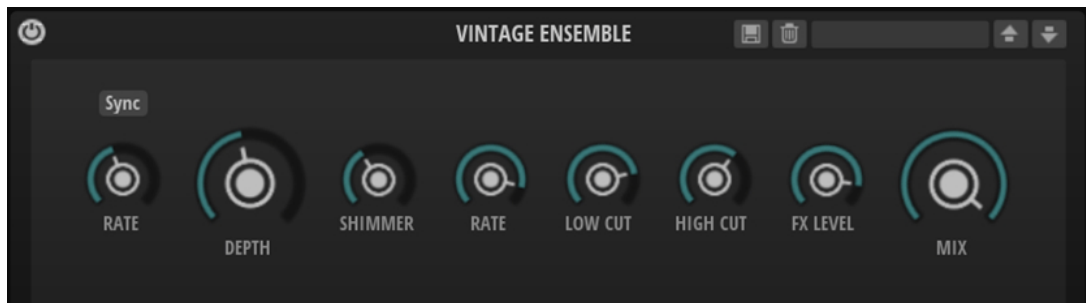


Type

Allows you to switch between three classic predefined chorus and vibrato settings (**C1**, **C2**, **C3**, and **V1**, **V2** and **V3**, respectively).

Vintage Ensemble

This effect emulates the sound of classic ensemble modulation effects. It is based on a delay with LFO-modulated delay times. A secondary LFO with higher frequencies is used to produce the so-called shimmer.



Rate

Sets the frequency of the LFO.

Sync

Allows you to set the **Rate** value in fractions of beats.

Depth

Sets the intensity of the delay time modulation by the LFO.

Shimmer

Sets the intensity of a secondary faster delay time modulation.

Shimmer Rate

Determines the relation between the speed of the primary and the secondary delay modulation. For example, at a value of 10, the secondary modulation is 10 times faster.

Low Cut

Applies a low-cut filter to the signal. Only frequencies above the set frequency are sent to the effect.

High Cut

Applies a high-cut filter to the signal. Only frequencies below the set frequency are sent to the effect.

FX Level

Allows you to adapt the effect signal level to compensate for level reductions caused by the low-cut and high-cut filters.

Mix

Sets the ratio between the dry and the wet signal.

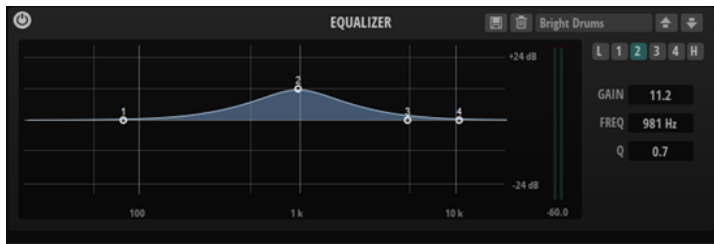
EQ/Filter Effects

The **EQ/Filter** submenu contains the equalizer and filter effects.

Equalizer

This high-quality 4-band parametric equalizer allows you to shape the tone color, to create a brighter or darker sound, for example. All bands are fully parametric with adjustable **Gain**,

Frequency, and **Quality** parameters. Furthermore, you can add a high-cut and a low-cut filter and edit their settings.



Click one of the numbered buttons to show the settings for the corresponding frequency band. The two mid-range bands act as peak filters, and the low and high bands act as shelving filters. Each frequency band offers the following controls:

Gain

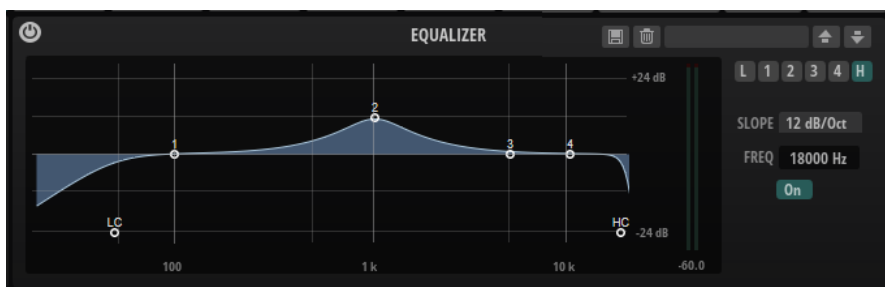
Sets the amount of cut or boost for the corresponding band.

Freq

Sets the frequency that is cut or boosted with the **Gain** parameter.

Q (Quality)

Adjusts the bandwidth of the mid-range peak filters from wide to narrow. By increasing the **Q** value on the low and high shelving filters, you can add a dip to their shape.



The buttons to the left and the right of the numbered buttons allow you to show the settings for the low-cut and the high-cut filter, respectively. For these filters, the following parameters are available:

Low-Cut On/Off

Activates/Deactivates the low-cut filter.

High-Cut On/Off

Activates/Deactivates the high-cut filter.

Slope

Sets the slope for the filter. You can choose from 6, 12, 24, 36, and 48 dB per octave.

Freq

Sets the frequency for the filter.

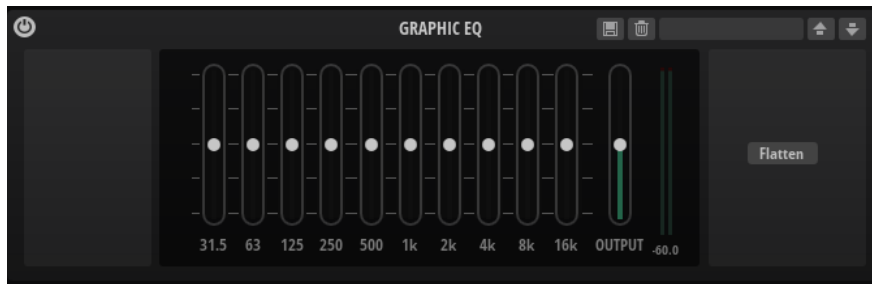
Output meter

Allows you to monitor the output level. The peak level is shown below the meter.

To reset the peak level, click **Reset Output Peak Level** below the meter.

Graphic EQ

Graphic EQ is an equalizer with ten frequency bands that can be cut or boosted by up to 12 dB.



Output

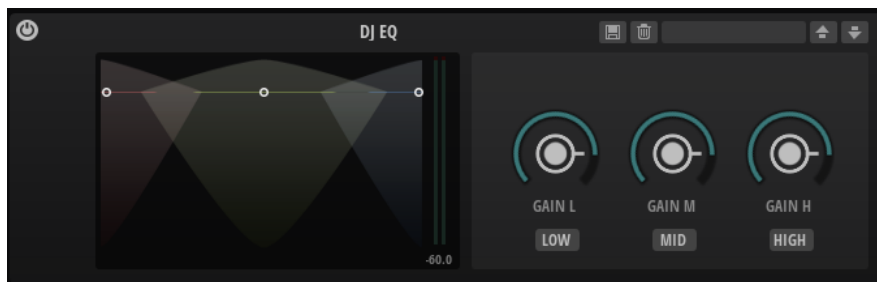
Controls the overall output level of the equalizer.

Flatten

Resets all frequency bands to 0 dB.

DJ EQ

DJ-EQ is an easy-to-use 3-band parametric equalizer that resembles the EQs found on typical DJ mixers. This plug-in is designed for quick sound fixes.



Low Freq/Mid Freq/High Freq

Set the amount of boost or attenuation for the low, mid, and high bands.

You can also click and drag in the display to change these values.

Low Cut/Mid Cut/High Cut

Cut the low, mid, and high bands.

Output meter

The meter on the right allows you to monitor the output level. The peak level is shown below the meter.

To reset the peak level, click the value field.

Resonator

The Resonator effect comes with 14 predefined filter shapes that determine the basic sound character. In addition, three LFOs can be used to modulate each filter separately, which allows you to add extra motion to the sound.

The sound of the human voice or of acoustic instruments is characterized by distinctive formant regions, that is, by resonances in the frequency spectrum that are typical for a particular sound. For example, the vowel "ah" (as in father) sung by a male singer has three characteristic formants: $F1 = 570$ Hz, $F2 = 840$ Hz, and $F3 = 2410$ Hz. The Resonator effect allows you to induce such formant regions to a sound by using three filters that are connected in parallel. You can

specify the positions and levels of the formant regions by adjusting the **Cutoff**, **Resonance**, and **Gain** parameters of the filters.

Resonator Shape

Defines the basic sound character of the effect. Each shape is a unique combination of different filter types for the low, mid, and high frequency bands.

Option	Filter Low/Mid/High
Low-Pass 1	LP6/LP6/LP6
Low-Pass 2	LP12/LP12/LP12
Band-Pass 1	BP12/(-)BP12/BP12*
Band-Pass 2	BP12/BP12/BP12
High-Pass 1	HP6/HP6/HP6
High-Pass 2	HP12/HP12/HP12
Peak 1	LP6/(-)BP12/HP6*
Peak 2	LP6/BP12/HP6
Bat 1	HP12/BP12/LP12
Bat 2	HP6/BP12/LP6
Wings 1	LP6/BR12/HP6
Wings 2	HP12/BR12/LP12
Wings 3	LP6/(-)BR12/HP6*
Wings 4	HP12/(-)BR12/LP12*

*(-1) means that the phase is inverted

Cutoff Spread

Spreads the cutoff frequencies between the channels of the effect.

For example, if the effect is used in stereo, positive **Cutoff Spread** values shift the cutoff down on the left channel and up on the right channel.

Mix

Sets the ratio between the dry and the wet signal.



Filter Page Parameters

For the low, mid, and high frequency bands, the following parameters are available:

Cutoff

Adjusts the cutoff frequency of the filter, that is, the center frequency of the formant region.

Resonance

Adjusts the resonance of the filter. The resonance determines how much the formant region is emphasized. With higher settings, the filter self-oscillates, which results in a ringing tone.

LFO Modulation Source

Allows you to select the LFO that modulates the cutoff.

LFO Modulation Depth

Adjusts the cutoff modulation of the LFO.

Gain

Adjusts the input gain of the filter. The gain determines the level of the formant region.

LFO Page



For the three LFOs, the following parameters are available:

LFO Wave Shape

Waveform selects the basic type of waveform. **Shape** changes the characteristics of the waveform.

- **Sine** produces smooth modulation, suitable for vibrato or tremolo. **Shape** adds additional harmonics to the waveform.
- **Triangle** is similar to **Sine**. **Shape** continuously changes the triangle waveform to a trapezoid.
- **Saw** produces a ramp cycle. **Shape** continuously changes the waveform from ramp down to triangle to ramp up.
- **Pulse** produces stepped modulation, where the modulation switches abruptly between two values. **Shape** continuously changes the ratio between the high and low state of the waveform. If **Shape** is set to 50%, a square wave is generated.
- **Ramp** is similar to the **Saw** waveform. **Shape** adds a gradually increasing amount of silence before the sawtooth ramp up begins.
- **Log** produces a logarithmic modulation. **Shape** continuously changes the logarithmic curvature from negative to positive.
- **S & H 1** produces random stepped modulation, where each step is different. **Shape** puts ramps between the steps and changes the **S & H** into a smooth random signal, with the control set fully to the right.
- **S & H 2** is similar to **S & H 1**. The steps alternate between random high and low values. **Shape** puts ramps between the steps and changes the **S & H** into a smooth random signal, with the control set fully to the right.

Freq

Determines the frequency of the cutoff modulation.

Sync

Allows you to set the **Freq** parameter in fractions of beats.

Spread

For each channel of the effect, there is a separate LFO signal. This parameter spreads the phase of the LFO signals across the different channels.

For example, if the effect is used in stereo, positive values shift the LFO phase forward on the left channel and backward on the right channel.

Dynamics Effects

The **Dynamics** submenu contains the dynamics effects.

Compressor

Compressor reduces the dynamic range of a sound. This way, the sound gains headroom. You can use this extra headroom to make the overall sound louder again.



The graphical control to the left indicates the compression curve. You can edit the **Threshold** and **Ratio** values with the handles of this control. The input and output VU meters indicate the level before and after the compression. The Gain Reduction meter indicates the current attenuation of the level.

Threshold

Sets the threshold. Sounds that are louder than the threshold are reduced in gain. Sounds below the threshold remain unchanged.

Ratio

Sets the amount of gain reduction for sounds that are louder than the threshold. The higher the ratio, the more the output is lowered. For example, if the ratio is set to 2:1 and the amplitude of the sound is 4 dB above the threshold, the output is lowered by 2 dB. If the amplitude is 8 dB above the threshold, the output is lowered by 4 dB.

Attack

Determines how fast the effect reacts to sounds that exceed the threshold. The longer the **Attack** time, the longer it takes to reduce the gain. With longer **Attack** times, the onset of sounds exceeding the threshold passes through unprocessed.

Release

Determines how fast the Compressor effect reacts to sounds that fall below the threshold. The longer the **Release** time, the longer it takes to return to the original level.

Make-Up

Raises the overall level of the sound. This can become necessary if too much gain reduction is introduced by the **Threshold** and **Ratio** parameters. You can see the amount of gain reduction in the Gain Reduction (**GR**) meter.

Mix

Sets the ratio between the dry and the wet signal.

Limiter

Limiter prevents the sound from exceeding the set output level. This can be used to avoid clipping in subsequent effects, for example.



The input and output meters indicate the level before and after the Limiter. The gain reduction meter in the middle indicates the current attenuation of the level. The peak level is shown below each meter. To reset the peak level, click the value field.

Threshold (-20 to 0 dB)

Determines the level where the limiter kicks in. Only signal levels above the set threshold are processed.

Attack

Determines how fast the effect reacts to sounds that exceed the threshold. The longer the **Attack** time, the longer it takes to reduce the gain. With longer **Attack** times, the onset of sounds exceeding the threshold passes through unprocessed.

Release

Sets the time after which the gain returns to the original level when the signal drops below the threshold.

Make-Up

Raises the overall level of the sound. This can become necessary if too much gain reduction is introduced. You can see the amount of gain reduction in the gain reduction meter.

Mix

Sets the ratio between the dry and the wet signal.

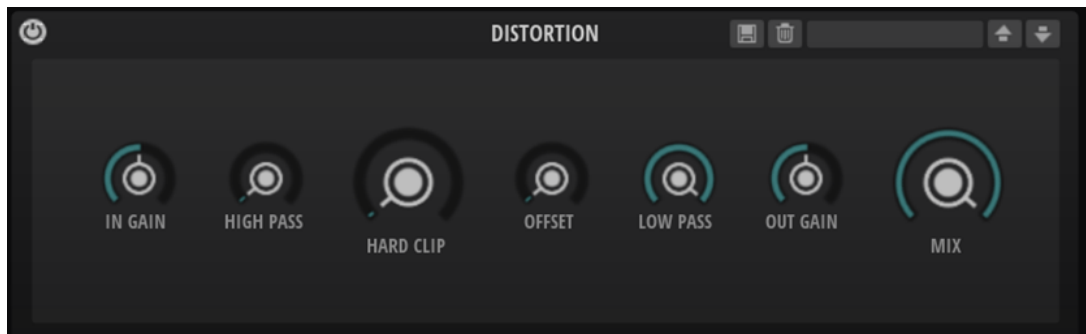
If **Mix** is set to 0%, only the wet effect signal is heard. If **Mix** is set to 100%, the output is composed in equal parts of the effect signal and the dry sound.

Distortion Effects

The **Distortion** submenu contains the distortion effects.

Distortion

This effect adds bright, harmonic distortion to the sound.



Input Gain

Adjusts the input level of the distortion.

High-Pass Cutoff

High-pass filter with 6 dB/oct. Frequencies below the cutoff are attenuated.

Hard Clip

Adds distortion to the signal.

Hard Clip Offset

Allows you to produce odd harmonics and even harmonics. The higher the setting, the more even harmonics are produced.

Low-Pass Cutoff

Low-pass filter with 6 dB/oct. Frequencies above the cutoff are attenuated.

Output Gain

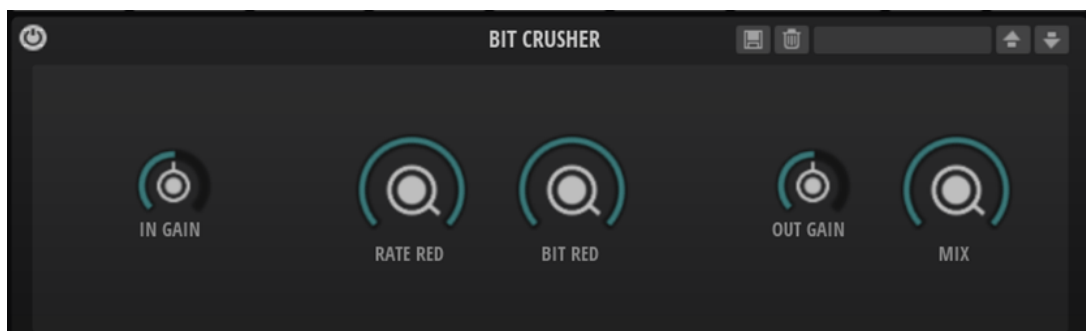
Adjusts the output level of the distortion.

Mix

Sets the ratio between the dry and the wet signal.

Bit Crusher

This effect allows you to add distortion using aliasing or quantization noise.



In Gain

Adjusts the input level of the sound.

Rate Red (Rate Reduction)

Rate reduction distorts the sound by means of aliasing. The lower the setting, the more aliasing is added.

Bit Red (Bit Reduction)

Bit reduction distorts the sound by means of quantization noise. The lower the setting, the more quantization noise is added.

Out Gain

Adjusts the output level of the sound.

Mix

Sets the ratio between the dry and the wet signal.

Pan Effects

The **Pan** submenu contains the stereo panorama effect.

Stereo Pan

This effect allows you to set the stereo position and width of the signal.



Pan

Sets the pan position of the signal. The panning is available for mono and stereo input signals.

Input Swap

Swaps the stereo channels.

Width

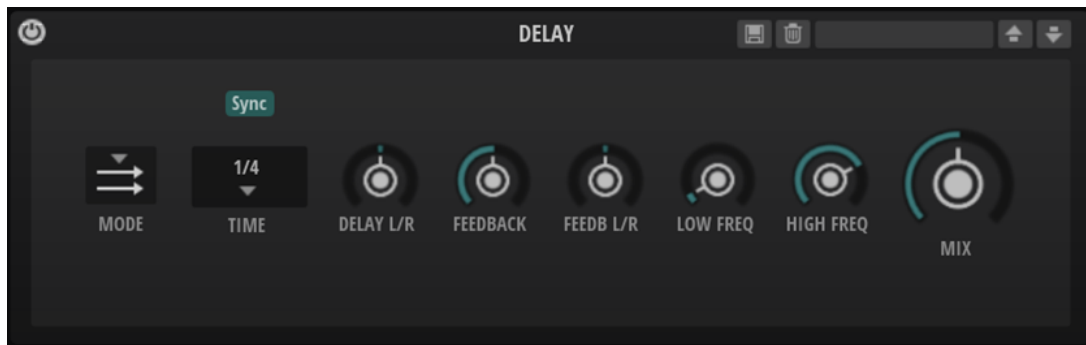
Adjusts the stereo width of the signal from stereo to mono.

Time Effects

The **Time** submenu contains the Delay and Reverb effects.

Delay

This effect produces delays, with adjustable time, feedback, and filters.



Delay Mode

- **Stereo** has two delays in parallel, one for the left and one for the right audio channel, each with a feedback path of its own.
- **Cross** has two delay lines with cross feedback, where the delay of the left channel is fed back into the delay of the right channel, and vice versa.
- **Ping-Pong** mixes the left and right input channels and sends the mixed signal to hard-panned left and right delays. This way, the echoes bounce from left to right, like a ping-pong ball, in the stereo panorama.

Delay Time

Sets the overall time for the left and right delay. Use the **Delay L/R** parameter to shorten the time for the left or right delay.

Sync

Allows you to synchronize the delay time to the host tempo. If **Sync** is activated, the time is set as a note value.

NOTE

The maximum delay time is 5000 ms. If the note length exceeds this value, it is automatically shortened.

Delay L/R

Offsets the time of the left or right delay from the overall delay time. At a factor of 1, the right or left delay time has the same length as the overall delay time. At a factor of 0.5, the time is half as long as the overall delay time.

- To offset the left delay time, turn the control to the left.
- To offset the right delay time, turn the control to the right.

Feedback

Sets the overall amount of feedback for the left and right delay. Feedback means the output of the delay is fed back to its input. Set to 0%, you hear only one echo. With a setting of 100%, the echoes are continuously repeated.

Feedback L/R

Offsets the amount of feedback of the left or right delay from the overall feedback. A factor of 1 means that the amount of feedback corresponds to the overall feedback. A factor of 0.5 means that the amount is half the overall feedback.

- To offset the left feedback, turn the control to the left.
- To offset the right feedback, turn the control to the right.

NOTE

This parameter is only available in **Stereo** mode.

Low Freq

Attenuates the low frequencies of the delays.

High Freq

Attenuates the high frequencies of the delays.

Mix

Sets the ratio between the dry and the wet signal.

Reverb

This effect produces a high-quality algorithmic reverb with early reflections and reverb tail.



Predelay

Determines the amount of time between the dry signal and the onset of the reverb. With higher **Predelay** values, you can simulate larger rooms.

Room Size

Controls the dimensions of the simulated room. With a setting of 100%, the dimensions correspond to a cathedral or a large concert hall. With a setting of 50%, the dimensions correspond to a medium-sized room or studio. Settings below 50% simulate the dimensions of a small room or a booth.

Density

Adjusts the echo density of the reverb tail. With a setting of 100%, single reflections from walls cannot be heard. The lower this value, the more audible the single reflections.

Shape

Controls the attack of the reverb tail. With a setting of 0%, the attack is more immediate, which is a suitable setting for drums. The higher this value, the less immediate the attack.

Width

Adjusts the output of the reverb signal between mono and stereo. With a setting of 0%, the output of the reverb is mono. At 100%, it is stereo.

Chorus On/Off

Activates/Deactivates the chorus effect.

Chorus Rate

Specifies the frequency of the pitch modulation.

Chorus Depth

Sets the intensity of the pitch modulation.

Main Time

Controls the overall reverb time of the tail. The higher this value, the longer the reverb tail will decay. With a setting of 100%, the reverb time is infinitely long. The **Main Time** parameter also represents the mid band of the reverb tail.

High Time

Controls the reverb time for the high frequencies of the reverb tail. With positive values, the decay time of the high frequencies is longer. With negative values, it is shorter. Frequencies are affected depending on the **High Freq** parameter.

Low Time

Controls the reverb time for the low frequencies of the reverb tail. Positive values result in a longer decay for the low frequencies. Negative values result in a shorter decay. Frequencies are affected depending on the **Low Freq** parameter.

High Cut

Attenuates the high frequencies of the early reflections. The lower this value, the fewer high frequencies are present in the early reflections.

Mix

Sets the ratio between the dry and the wet signal.

Voice Section

The **Voice** section gives you access to the basic voice-related parameters and to the modulation assignments for the **Pitchbend** modulation source.



Mono

Activates monophonic playback.

Retrigger

This option is only available in **Mono** mode. If **Retrigger** is activated, a note that was stolen by another note is retriggered if you still hold the stolen note when you release the new one.

This way, you can play trills by holding one note and quickly and repeatedly pressing and releasing another note, for example.

Polyphony

If **Mono** mode is deactivated, you can use this parameter to specify how many notes can be played simultaneously.

Voice Mode

Determines which notes are stolen during playback and whether new notes are triggered when the **Polyphony** setting is exceeded.

- **Last** – New notes have playback priority over the notes that were played before them.
If you exceed the maximum number of notes, the notes that were played first are stolen in chronological order (First in/First out), and the new notes are triggered.
- **First** – Older notes have playback priority over newer notes.
If you exceed the maximum number of notes while older notes are still being held, no notes are stolen. New notes are only triggered if a free voice is available.
- **Low** – Low notes have playback priority over higher notes.
If you exceed the maximum number of notes by playing a lower note than the ones that are held, the highest note is stolen, and the new note is triggered.
If you exceed the maximum number of notes by playing a higher note than the ones that are held, no note is stolen, and no new note is triggered.
- **High** – High notes have playback priority over lower notes.
If you exceed the maximum number of notes by playing a higher note than the ones that are held, the lowest note is stolen, and the new note is triggered.
If you exceed the maximum number of notes by playing a lower note than the ones that are held, no note is stolen, and no new note is triggered.

Retrigger Mode

Defines the trigger behavior for new notes.

- **Normal** triggers a new note when the previous note gets stolen.
- **Resume** retriggers the envelope, but resumes at the level of the stolen note. The pitch is set to the new note.
- If **Legato** is selected, the envelope keeps running, and the pitch is set to the new note.

Glide

Allows you to bend the pitch between notes that follow each other. You achieve the best results in **Mono** mode.

Fingered

Activate this parameter to glide the pitch only between notes that are played legato.

Sync

Activate **Sync** to synchronize the glide time to the host tempo. Select a note value from the pop-up menu. To change the selected note value to a triplet, activate the **Triplets** button.



Glide Time

Sets the glide time, that is, the time it takes to bend the pitch from one note to the next.

Curve

Allows you to select one of three curve types to define the glide behavior.

- With the **Linear** curve, the pitch glides from the start to the end pitch at a continuous speed.
- With the **Exponential** curve, the pitch starts gliding at a higher speed and decelerates towards the end pitch. This behavior is similar to the natural pitch glide produced by a singer.
- With the **Quantized** curve, the pitch glides from the start to the end pitch in semitones.

Pitchbend Up/Pitchbend Down


Determines the range of the modulation that is applied when you move the pitchbend wheel.

Retrigger Mode

Defines the retrigger behavior for new notes.

- **Normal** triggers a new note when the previous note gets stolen. The sample and the envelope of the new note are triggered from the start.
To minimize discontinuities, use the **Fade Out** parameter of the zone.
- **Resume** does not always trigger a new note.
If the new note stays within the same zone, the envelope is retriggered, but resumes at the level of the stolen note. The pitch of the zone is set to the new note.
If the new note plays in a different zone, the sample and the envelope of the new note are triggered from the start.
- **Legato** does not always trigger a new note.
If the new note stays within the same zone, the envelope keeps running. The pitch of the zone is set to the new note.
If the new note plays in a different zone, the sample and the envelope of the new note are triggered from the start.

Modulation

In the **Modulation** section on the right, you can set up a modulation assignment using the user envelope as the modulation source. To show all available parameters, click **Open Modulation Assignment Editor** .

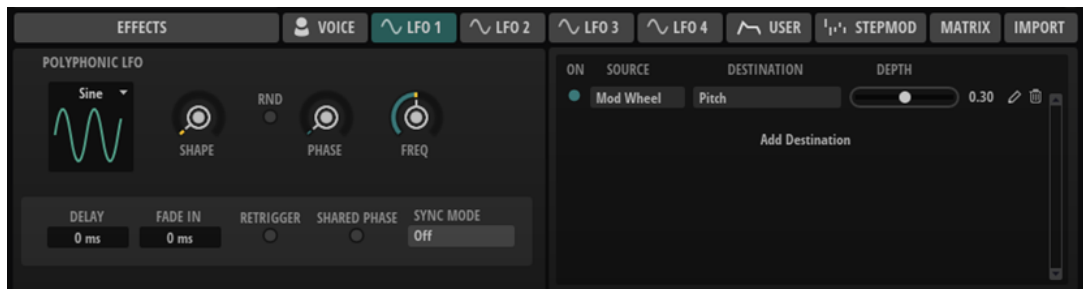
The parameters are the same as in the modulation matrix.

RELATED LINKS

[Modulation Matrix](#) on page 60

LFO 1-4

You can use four separate LFOs. The LFOs 1 and 2 are polyphonic, and the LFOs 3 and 4 are monophonic.



NOTE

The parameters **Delay**, **Fade In**, and **Shared Phase** are only available for the polyphonic LFOs **LFO 1** and **LFO 2**.

LFO Wave Shape

Waveform selects the basic type of waveform. **Shape** changes the characteristics of the waveform.

- **Sine** produces smooth modulation, suitable for vibrato or tremolo. **Shape** adds additional harmonics to the waveform.
- **Triangle** is similar to **Sine**. **Shape** continuously changes the triangle waveform to a trapezoid.
- **Saw** produces a ramp cycle. **Shape** continuously changes the waveform from ramp down to triangle to ramp up.
- **Pulse** produces stepped modulation, where the modulation switches abruptly between two values. **Shape** continuously changes the ratio between the high and low state of the waveform. If **Shape** is set to 50%, a square wave is generated.
- **Ramp** is similar to the **Saw** waveform. **Shape** adds a gradually increasing amount of silence before the sawtooth ramp up begins.
- **Log** produces a logarithmic modulation. **Shape** continuously changes the logarithmic curvature from negative to positive.
- **S & H 1** produces random stepped modulation, where each step is different. **Shape** puts ramps between the steps and changes the **S & H** into a smooth random signal, with the control set fully to the right.
- **S & H 2** is similar to **S & H 1**. The steps alternate between random high and low values. **Shape** puts ramps between the steps and changes the **S & H** into a smooth random signal, with the control set fully to the right.

Rnd (Random Phase)

If this button is activated, each note starts with a randomized start phase.

NOTE

The **Phase** control cannot be used if **Rnd** is activated.

Phase

Sets the initial phase of the waveform when the LFO is retriggered.

Freq

Controls the frequency of the modulation, that is, the speed of the LFO.

Delay

Determines the delay time between the moment you play a note and the moment the LFO takes effect.

Fade In

Sets the fade in time for the polyphonic LFOs.

Retrigger

Determines whether the LFO is restarted when a note is triggered. The waveform restarts at the position set with the **Phase** parameter.

- If this button is activated, the LFO starts with each triggered note.
- If this button is deactivated, the LFO runs freely.

Shared Phase

If **Shared Phase** is activated, each voice generates its own LFO signal, but the phases are synchronized, which means that the polyphonic LFO acts like a monophonic LFO.

TIP

If you want legato-played notes to use the phase of the first note, use **Shared Phase** in combination with **Retrigger**.

Sync Mode


Sync Mode is used to synchronize the LFO to the tempo of the host application.

- Select **Off** to adjust the speed of the modulation in Hertz.
- Select **Tempo + Retrig** to adjust the speed of the modulation in fractions of beats. You can also set dotted and triplet note values. The restart behavior of the LFO depends on the **Retrigger Mode**.
- Select **Tempo + Beat** to adjust the speed of the modulation in fractions of beats. You can also set dotted and triplet note values. The LFO restarts with the transport of the host and lines up to the beats of the project. The **Retrigger Mode** setting is not taken into account.

NOTE

The behavior of the **Frequency** parameter changes with the selected option.

Modulation

In the **Modulation** section on the right, you can set up a modulation assignment using the user envelope as the modulation source. To show all available parameters, click **Open Modulation Assignment Editor** .

The parameters are the same as in the modulation matrix.


User Envelope Section

This section provides an additional user envelope. The **Modulation** section on the right allows you to use the envelope as the modulation source and set up the modulation parameters.



- **Init Level** sets the initial level.
- **Attack** sets the attack time.
- **Attack Level** sets the attack level.
- **Decay** sets the decay time.
- **Sustain** sets the sustain level.
- **Release** sets the release time.
- **Release Level** sets the release level.
- **Velocity** determines how much the envelope intensity depends on the velocity. If this fader is set to 0, the envelope is fully applied. Higher values reduce the intensity for lower velocities.

Modulation

In the **Modulation** section on the right, you can set up a modulation assignment using the user envelope as the modulation source. To show all available parameters, click **Open Modulation Assignment Editor** .

The parameters are the same as in the modulation matrix.

RELATED LINKS

[Modulation Matrix](#) on page 60

Step Modulator Section

The polyphonic step modulator allows you to create rhythmic control sequences.



Steps

Sets the number of steps in the sequence. The maximum number of steps is 32.

Sync Mode

- **Off** allows you to adjust the speed at which the sequence repeats.
Whether the sequence restarts when you play a note depends on the **Retrigger Mode**.
- **Tempo + Retrig** allows you to adjust the length of the steps in fractions of beats. The speed of the modulation depends on the number of steps, the note value, and the tempo you set in your host application. To use triplet note values, activate **Triplet**.
Whether the sequence restarts when you play a note, depends on the selected **Retrigger Mode**.
- **Tempo + Beat** allows you to adjust the length of the steps in fractions of beats. The speed of the modulation depends on the number of steps, the note value, and the tempo you set in your host application. To use triplet note values, activate **Triplet**.
The sequence restarts with the transport of the host application and lines up to the beats of the project. **Retrigger Mode** is not taken into account.

Frequency

If **Sync Mode** is set to **Off**, this controls the speed at which the sequence is repeated.

Note

If **Sync Mode** is set to one of the **Tempo** settings, this adjusts the length of the steps in fractions of beats. You can also select triplet values.

Triplets

Activate this button to use triplet note values.

Retrigger Mode

Determines whether the sequence restarts when you play a note. This parameter is only available if **Sync Mode** is set to **Off** or **Tempo + Retrig**.

- If this parameter is set to **Off**, the sequence is not restarted. Instead, it resumes playback at the position where you released the key.
- If this parameter is set to **First Note**, the sequence restarts when a note is triggered and no other notes are held.
- If this parameter is set to **Each Note**, the sequence restarts each time a note is triggered.

Slope

Determines whether the step modulator jumps from step to step or creates ramps between the steps.

- **No Slope** produces hard steps.
- **Slope on Rising Edges** creates ramps for rising edges only.
- **Slope on Falling Edges** creates ramps for falling edges only.
- **Slope on All Edges** creates ramps for all edges.

Amount

If **Slope** is set to **Slope on Rising Edges**, **Slope on Falling Edges**, or **Slope on All Edges**, this parameter determines the time of the ramp between two steps. The higher the setting, the smoother the transitions between steps.

Step

Allows you to select a specific step.

Level

Shows the level of the selected step.

Snap

If **Snap** is activated, the level of each step can only be adjusted in steps of 1/12th.


Shift Pattern Right/Shift Pattern Left

Shift all the steps to the right/left. If you shift the pattern to the left, the first step is moved to the end. If you shift the pattern to the right, the last step is moved to the beginning.

Reverse Pattern

Reverses the pattern, that is, inverts the order of all steps.

Modulation

In the **Modulation** section on the right, you can set up a modulation assignment using the user envelope as the modulation source. To show all available parameters, click **Open Modulation Assignment Editor** .

The parameters are the same as in the modulation matrix.

RELATED LINKS

[Modulation Matrix](#) on page 60

Editing Steps

You can adjust the steps separately, but you can also use modifier keys to enter or edit multiple steps simultaneously.

- To set the level of a step, click at the corresponding position in the graphical editor.
- To change the value of a step, drag the step up or down, or enter a new value in the **Level** value field.
- To reset the level of a step to 0%, **Ctrl/Cmd**-click the step.
- To reset all steps, hold **Shift - Ctrl/Cmd**, and click in the graphical editor.
- To adjust all steps at the same time, **Shift**-click, and drag a step.
- To draw a ramp with steps, hold down **Alt/Opt**, and draw a line.
- To draw symmetric ramps at the beginning and the end of the sequence, hold down **Shift - Alt/Opt**, and draw a line.
- To gradually raise or lower the value of the selected step, use the **Up Arrow** and **Down Arrow** keys.
By default, the value changes in increments of 1%. Hold **Shift** to use increments of 0.1% instead.
- If the graphical editor has the keyboard focus, you can use the left and right arrow keys to select the previous or the next step.

Creating Modulations in Steps of Semitones

PROCEDURE

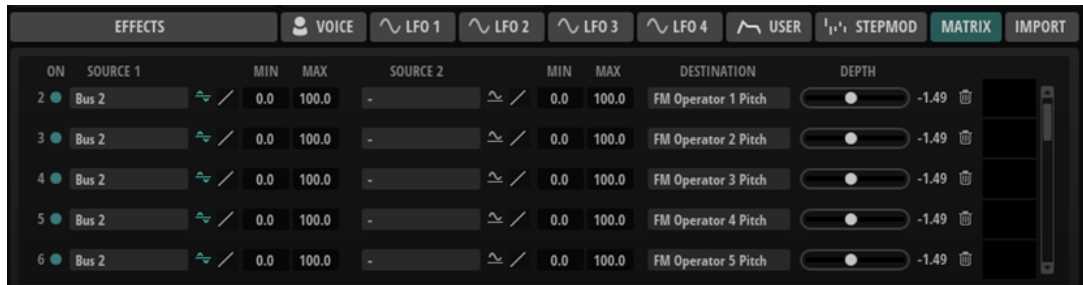
1. Activate **Snap**.
2. In the modulation matrix, assign the **Step Modulator** to **Pitch**.
3. Set the **Modulation Depth** to +12.

As a result, the levels of the steps represent semitone intervals.

4. In the **Step Modulator**, adjust each step to the interval that you want to use.

Modulation Matrix

In the modulation matrix, you can interconnect modulation sources, such as LFOs and envelopes, with modulation destinations, such as pitch, cutoff, amplitude, etc.



On

Activates/Deactivates the modulation row.

Source 1

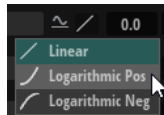
Shows the modulation source. Click in the field to select a new source.

Polarity: Unipolar/Bipolar

Allows you to set the polarity of a modulation source. The polarity specifies the value range. Unipolar sources modulate between 0 and +1. Bipolar sources modulate between -1 and +1.

Curve

Allows you to choose a modulation curve that is superimposed on the modulation signal.



- With the **Logarithmic Pos** curve, a straight modulation signal, such as the output of the modulation wheel, becomes inward-shaped.
- With the **Logarithmic Neg** curve, a straight modulation signal becomes outward-shaped.
- With the **Linear** curve, the modulation signal is not modified.

Min/Max

These values allow you to limit the modulation to a specific range only.

Source 2

Shows the modulation modifier, a secondary modulation source that manipulates the outgoing modulation signal. For example, you can assign the mod wheel to control the intensity of the modulation.

Destination

Shows the destination parameter. Click in the field to select a new destination.

Depth

Adjusts the modulation depth, that is, the intensity of the modulation.

Delete Modulation

Deletes the modulation row.

Creating Modulations in the Modulation Matrix

In the modulation matrix, you create modulation assignments by selecting modulation sources, modifiers, and destinations from the pop-up menus.

PROCEDURE

1. In the lower section of the **Synth** page, open the **Modulation Matrix** section.
2. Select a modulation source and a modulation destination, for example, **LFO1** as the source and **Pitch** as the destination.
3. Use the horizontal fader to adjust the modulation depth.
4. Optional: Click the **Source 2** field, and select a modifier, or change the polarity of the source. For example, select **Pitch Bend** as the modifier, and set it to unipolar.
5. Optional: Use the **Min** and **Max** value fields to limit the modulation range.
6. Select the modulation curve.

Import Section

The **Import** section allows you to import original DX7 .syx files.



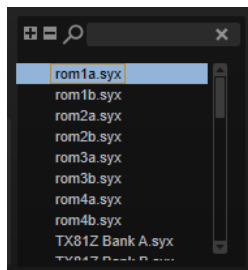
Import Folder

Allows you to specify a folder that contains the DX7 files that you want to import. Once a folder is specified, it is scanned for .syx files, including all subfolders. All files that are found are displayed in the tree structure on the right.

Result Tree

Selecting a file in the tree structure shows its 32 programs on the right. Click a program to select it.

You can use the search filter at the top to show only programs whose names match the entered text. To remove the search text, click the **Reset Filter** button to the right of the text field.



Set Only FM Oscillator

Allows you to import only the settings of the FM oscillator. All other zone settings remain unaffected. By default, this option is deactivated, to best match the sound of the DX7 keyboard.

Lock Velocity Scale

Allows you to prevent changes to the **Velocity Scale Min** and **Velocity Scale Max** settings during import.

Emulation Mode

You can choose from different emulation modes: **HALion**, **FM-X**, and **DX7**.

- In **HALion** mode, the oscillator works with continuous values, for maximum precision.
- **FM-X** emulates the characteristics of Yamaha's Montage synthesizers.
- **DX7** emulates the characteristics of the Yamaha DX7 synthesizer.

Velocity Scale Min/Velocity Scale Max

Allow you to simulate the velocity range of the original DX7 keyboard. By default, **Velocity Scale Min** is set to 0, and **Velocity Scale Max** is set to 100.

- To play the preset with the full velocity range, set the parameters to 0 and 127.
- To invert the velocity, set **Velocity Scale Min** to the higher value and **Velocity Scale Max** to the lower value.

Note Shift

Allows you to shift the incoming MIDI notes by +/- 24 semitones on importing DX7 or TX81Z .syx files.

Importing DX7 SysEx Files

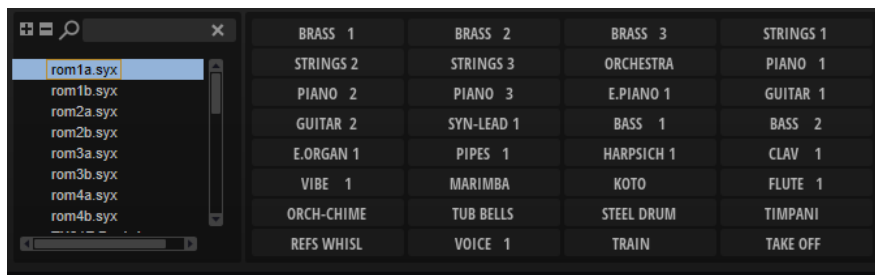
You can import .syx files to use them as they are or to edit them further.

PROCEDURE

1. In the **Import** section, use the **Import Folder** field to specify the folder containing the .syx files.

You can either enter the path into the field or click the button on the right and navigate to the folder. When files are found in this location, they are shown on the right.

2. To search for a specific file name or instrument, enter the search text in the search field.
3. Select a file to show its contents.

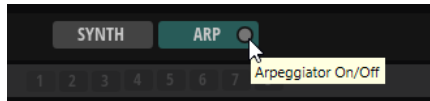


4. Click a program to load it.
-

Arp Page

This page contains the integrated arpeggiator.

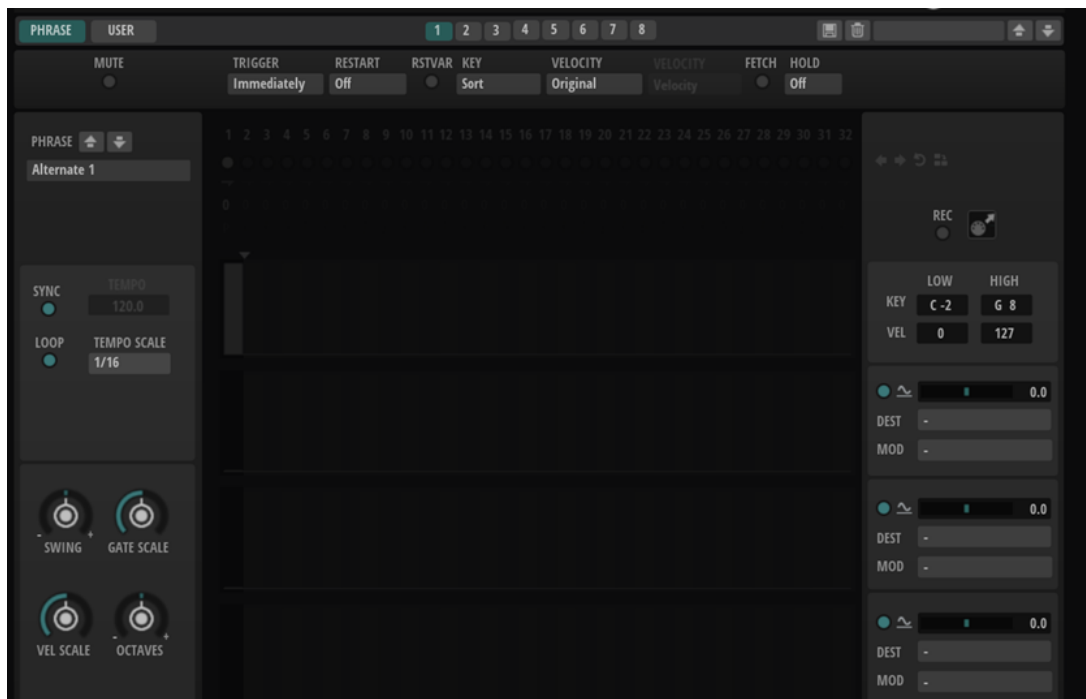
To use the arpeggiator, activate it using its **On/Off** button.



The arpeggiator has two pages: **Phrase** and **User**.

Phrase Page

The **Phrase** page allows you to load and use the factory phrases.



Mute

Mutes playback. The phrase still plays in the background. If you deactivate **Mute**, playback resumes immediately.

Trigger Mode

Determines the moment when the arpeggiator scans for new notes that you play on the keyboard.

- If **Immediately** is selected, the arpeggiator continuously scans for new notes. The phrase changes immediately, in reaction to your playing.
- If **Next Beat** is selected, the arpeggiator scans for new notes at every new beat. The phrase changes at each new beat, in reaction to your playing.
- If **Next Measure** is selected, the arpeggiator scans for new notes at the start of new measures. The phrase changes on each new measure, in reaction to your playing.

Restart Mode

- If this is set to **Off**, the phrase runs continuously and does not restart at chord or note changes.
- **New Chord** restarts the phrase on new chords.

NOTE

The phrase does not restart upon notes that are played legato.

- **New Note** restarts the phrase with each new note that you play.
- **Sync to Host** aligns the phrase with the beats and measures of your host application each time that you start the transport.

RstVar (Restart on Variation Change)

This option is available for new chords and new notes. If this button is activated, changing a variation restarts the arpeggiator, even if no new notes or chords are triggered.

Key Mode

Determines if and how the playback of the phrase is affected by the order of the notes, as played on the keyboard.

- If **Sort** is selected, the notes are played in the order of the selected phrase, regardless of the chronological order.
- If **As Played** is selected, the notes are played in the order in which you play them on the keyboard.
- If **Direct** is selected, the phrase creates controller events instead of notes. You hear the notes that you play plus any controller events of the phrase, such as pitch bend, volume, pan, etc.

NOTE

Not all phrases contain controller data.

Vel Mode

- If **Original** is selected, the notes of the phrase play with the velocity that is saved in the phrase.
- If **Vel Controller** is selected, you can choose a velocity controller to generate or modulate the velocities of the notes.
- If **Original + Vel Controller** is selected, the phrase velocity is determined by the combination of the velocity saved in the phrase and the velocity derived from the velocity controller.

Vel Controller

If the **Vel Mode** pop-up menu is set to **Vel Controller** or **Original + Vel Ctrl.**, the **Vel Controller** pop-up menu is available. It allows you to generate or modulate the velocities of the notes using the incoming controller values.

- If **Velocity** is selected, the triggered notes inherit the velocity of the note that you play.
- If **Aftertouch** is selected, the triggered notes receive their velocity from the aftertouch controller.
- If **Poly Pressure** is selected, the triggered notes receive their velocity from the poly pressure controller. This allows you to control the velocity via the keys.

- Selecting **MIDI Controller** opens a submenu, where you can select a MIDI controller.
The value of this MIDI controller is used as the velocity for the triggered notes.

Fetch

If the **Vel Controller** pop-up menu is set to **Aftertouch**, **Poly Pressure**, or a MIDI controller, you can use the **Fetch** option to change the way that the notes are generated.

- If **Fetch** is activated, the first note that you play defines the initial velocity. As soon as the controller value exceeds this velocity, new notes receive their velocity from the controller.
- If **Fetch** is deactivated, the generated notes receive their velocity from the current controller value.

NOTE

Fetch is not available if the **Vel Controller** pop-up menu is set to **Velocity**.

Hold

Allows you to prevent the phrase from stopping or changing when the keys are released.

- If **Off** is selected, the phrase changes as soon as you release a key. The phrase stops immediately when you release all keys.
- If **On** is selected, the phrase plays to the end, even if the keys are released. If **Loop** is activated, the phrase is repeated continuously.
- If **Gated** is selected, the phrase starts to play when the first key is played. It plays silently in the background, even if the keys are released, and resumes playback at the current position when you press any of the keys again. This way, you can gate the playback of the phrase.

Wrap

For all modes except **Step** and **Chord**, you can use this parameter to restart the arpeggio after a specified number of steps.

NOTE

Deactivated steps are taken into account.

In **Step** and **Chord** mode, this parameter only affects the **Octaves** setting.

If the **Octaves** parameter is active, the arpeggio traverses the octaves and restarts from the original octave after the specified number of steps.

Key Replace

With this parameter, you can deactivate the **Key Select** function or specify how to replace missing keys.

For example, if **Key Select** is set to 1 - 2 - 3 - 4 and you play a chord with 3 notes, key 4 is considered missing.

- **Off** deactivates **Key Replace** and **Key Select**. The selected arpeggio plays back without modifications.
- **Arp** replaces the missing keys with the note that the arpeggio would normally play.
- **Rest** does not replace any missing keys. The arpeggio inserts a rest instead.
- **1st** replaces the missing keys with the first note in the note buffer.

- **Last** replaces the missing keys with the last note in the note buffer.
- **All** replaces the missing keys with all notes in the note buffer. The notes are played as a chord.

NOTE

Key Replace can be set for each individual variation.

Sync

Synchronizes the phrase to the tempo of your host application.

NOTE

In addition, you can set **Restart Mode** to **Sync to Host**. This aligns the phrase with the beats and measures of your host application.

Loop

Allows you to play the phrase in a loop.

Tempo Scale

Defines the rate at which notes are triggered, that is, the speed at which the phrase is running. In addition to the **Tempo** parameter, this gives you further control over the playback speed. You can specify a value in fractions of beats. You can also set dotted and triplet note values.

For example, if you change the **Tempo Scale** setting from 1/16 to 1/8, the speed is cut in half. If you set it to 1/32, the speed is doubled.

Groove Quantize

To adapt the timing of a phrase to an external MIDI file, you can drop this MIDI file on the **Groove Quantize** drop field.

The **Groove Quantize Depth** parameter to the right of the drop field determines how accurately the phrase follows the timing of the MIDI file.

Drag MIDI Phrase to Host Sequencer

Allows you to drag the recorded MIDI phrase to your host sequencer.

Swing

Shifts the timing of notes on even-numbered beats, which results in a “swing feeling”. Negative values shift the timing backward, and the notes are played earlier. Positive values shift the timing forward, and the notes are played later.

Gate Scale

Allows you to shorten or lengthen the notes of the phrase. At a value of 100%, the notes play with their original gate length.

Vel Scale

Allows you to raise or lower the note-on velocities of the phrase. At a value of 100%, the notes are played with their original velocity.

Octaves

Extends the phrase playback to include higher or lower octaves. Positive settings extend the playback to higher octaves, and negative settings to lower octaves. For example, a value of +1 first plays the phrase in the octave range that you originally played. Then, it repeats the phrase one octave higher.

Key Range

The **Low Key** and **High Key** parameters determine the key range that is used to trigger phrase playback.

Velocity Range

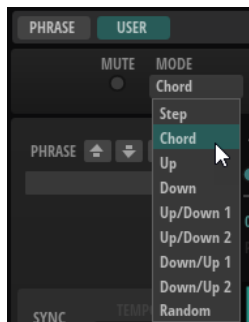
The **Low Vel** and **High Vel** parameters determine the velocity range that is used to trigger phrase playback.

User Page

The **User** page offers a user phrase editor with which you can create and save your own phrases.

The following additional parameters are available on the **User** page:

Arp Mode



Specifies the playback of the notes.

- If **Step** is selected, the last note that is received triggers a monophonic sequence.
- If **Chord** is selected, the notes are triggered as chords.
- If **Up** is selected, the notes are arpeggiated in ascending order.
- If **Down** is selected, the notes are arpeggiated in descending order.
- If **Up/Down 1** is selected, the notes are arpeggiated first in ascending, then in descending order.
- If **Up/Down 2** is selected, the notes are arpeggiated first in ascending, then in descending order. This mode depends on the set **Key Mode**.
If **Key Mode** is set to **Sort**, the highest and the lowest note are repeated.
If **Key Mode** is set to **As Played**, the first and the last note are repeated.
- If **Down/Up 1** is selected, the notes are arpeggiated first in descending, then in ascending order.
- If **Down/Up 2** is selected, the notes are arpeggiated first in descending, then in ascending order. This mode depends on the set **Key Mode**.
If **Key Mode** is set to **Sort**, the highest and the lowest note are repeated.
If **Key Mode** is set to **As Played**, the first and the last note are repeated.
- If **Random** is selected, the notes are arpeggiated in random order.

Wrap



For all modes except **Step** and **Chord**, you can use this parameter to restart the arpeggio after a specified number of steps.

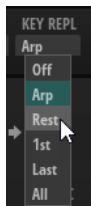
NOTE

Deactivated steps are taken into account.

In **Step** and **Chord** mode, this parameter only affects the **Octaves** setting.

If the **Octaves** parameter is active, the arpeggio traverses the octaves and restarts from the original octave after the specified number of steps.

Key Replace



With this parameter, you can deactivate the **Key Select** function or specify how to replace missing keys.

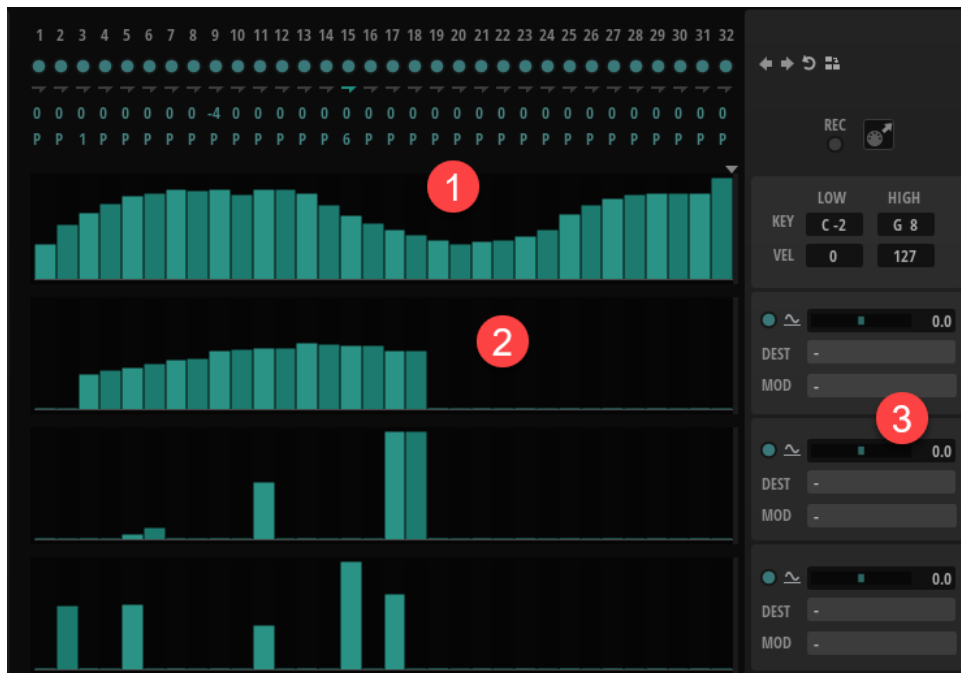
For example, if **Key Select** is set to 1 - 2 - 3 - 4 and you play a chord with 3 notes, key 4 is considered missing.

- **Off** deactivates **Key Replace** and **Key Select**. The selected arpeggio plays back without modifications.
- **Arp** replaces the missing keys with the note that the arpeggio would normally play.
- **Rest** does not replace any missing keys. The arpeggio inserts a rest instead.
- **1st** replaces the missing keys with the first note in the note buffer.
- **Last** replaces the missing keys with the last note in the note buffer.
- **All** replaces the missing keys with all notes in the note buffer. The notes are played as a chord.

NOTE

Key Replace can be set for each individual variation.

User Phrase Editor



- 1 The topmost row contains the velocity curve. The parameters for the individual velocity steps **Step On/Off**, **Step Legato**, **Step Transpose**, and **Step Key Select** are displayed above it.
- 2 Below the velocity curve, you can find the controller curves for MIDI controllers 111, 112, and 113.
- 3 The modulation rows to the right allow you to use the controller curves as modulation sources.

Step On/Off

Activates/Deactivates the corresponding step.

Step Legato

Activates legato between this step and the following step.

Step Transpose

Allows you to transpose the step by the specified number of semitones.

Step Key Select

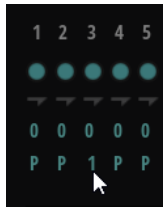
The arpeggiator scans the keyboard and writes the keys that you press into a note buffer. Depending on the selected **Key Mode**, this note buffer is sorted either by pitch or in the order in which you play the keys. **Key Select** allows you to play back a defined key from the note buffer. You can set up **Key Select** for each individual step, which allows you to create very elaborate phrases.

NOTE

Key Select cannot be used if **Arp Mode** is set to **Step** or **Chord**.

- To switch between the available **Key Select** values for a step, click the value, and drag up/down, or use the scroll wheel.
The following options are available:
 - **P** (Phrase) plays the note of the user phrase, according to the selected mode, for example, **Up**, **Down**, **Up/Down 1**, etc.

- The settings **1 - 8** play the corresponding keys from the note list. Which key is played depends on the **Key Mode** setting. For example, if **Key Mode** is set to **Sort**, setting **1** plays the lowest key.
- **L** (Last) always plays the last key from the note buffer. Depending on the **Key Mode**, this is the highest note or the last note in the note buffer.
- **A** (All) plays all keys from the note buffer as a chord.



MIDI Controller Lanes

The MIDI controllers 110, 111, and 112 from the three controller lanes are sent to the modulation destinations. When you export a recorded sequence, these controller values are also exported. This means that, once you add the exported MIDI sequence to the sequencer, you can deactivate the arpeggiator and play the notes and controller values using the sequencer.

The three modulation rows on the right allow you to use the three controller curves as modulation sources.

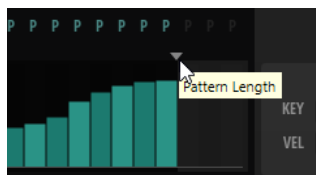
RELATED LINKS

[Editing User Phrases](#) on page 70

Editing User Phrases

You can create your own user phrases.

To specify the number of steps for the pattern, drag the **Pattern Length** handle to the right or left.



Editing Steps

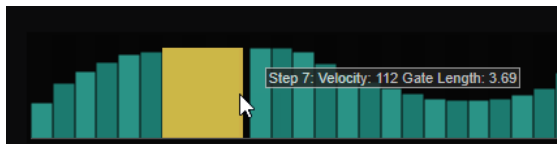
The height of a step represents its value. You can edit the steps in the following ways:

- To activate all steps, select **Enable All Steps** from the context menu.
- To adjust a value, click a step, and drag up or down.
- To adjust multiple steps, click and draw a curve.
- To adjust the velocity of all steps relatively, **Shift**-click and drag.
- To draw a ramp with steps, hold down **Alt/Opt**, and draw a line.
- To draw symmetric ramps at the beginning and the end of the sequence, hold down **Alt/Opt-Shift**, and draw a line.
- To reset the velocity of a step to 127, **Ctrl/Cmd**-click the step.
- To reset the velocity of all steps to 127, hold **Ctrl/Cmd-Shift**, and click a step.

- To introduce a legato between two steps, activate **Step Legato** for the first of these steps, so that a small arrow is shown.
If **Legato** is activated, the **Gate Scale** parameter is not taken into account.
- To transpose a step, click in the **Step Transpose** field, and enter the number of semitones for the transposition.

Adjusting the Gate length

The width of a pattern step represents its gate length.



- To adjust the gate length of a step, drag its right border.
- To adjust the gate length of all steps, hold down **Shift**, and drag the right border of a step. You can only adjust the length this way until a step reaches the next step. If you increase the gate length of a step so that it overlaps with the following step, the latter step is deactivated.
- To reset the length of a step to 1, **Ctrl/Cmd**-click its highlighted right border.
- To reset the length of all steps, hold down **Ctrl/Cmd - Shift**, and click on a highlighted right border.
- To fill the gaps between consecutive steps, select **Fill Gap** or **Fill All Gaps** from the context menu.

Adjusting the Phrase

- To shift the rhythm of the phrase, click **Shift Phrase Right** or **Shift Phrase Left**.
If you shift the rhythm of the phrase to the left, the first step is moved to the end. If you shift the phrase to the right, the last step is moved to the beginning.
- To reverse the phrase, click **Reverse Phrase**.
- To duplicate short phrases, click **Duplicate Phrase**.

NOTE

The maximum number of steps is 32. Therefore, phrases that contain more than 16 steps cannot be duplicated entirely.

Recording the MIDI Output of the Arpeggiator

The phrases that are played by the instrument depend on the played notes and can therefore not be exported directly. However, it is possible to generate exportable phrases by recording the MIDI output of the arpeggiator.

PROCEDURE

1. Click **Record MIDI Output**.
The arrow in the **Drag MIDI** field starts flashing to indicate record mode.
2. Play some notes.
3. When you are done, click **Record MIDI Output** again.
Recording stops. In the **Drag MIDI** field, the arrow remains lit to indicate that a MIDI phrase can be exported.

4. Click the **Drag MIDI** field, and drag the phrase onto a MIDI track in your host sequencer application.
-

Creating Variations

You can either start from scratch or base the new variation on an existing variation.

PROCEDURE

- Click one of the variation buttons.
 - To start from scratch, load a phrase, and edit the settings.
 - To use an existing variation as the base, use the **Copy** and **Paste** context menu commands.
-

RESULT

The variation can now be recalled by clicking the corresponding variation button.

NOTE

The parameters **Loop**, **Sync**, **Hold**, **Trigger Mode**, **Restart Mode**, **Key Mode**, **Vel Mode**, **Low/High Key**, and **Low/High Vel** are not part of the variations. You set them up only once.

Assigning Variations to Trigger Pads

If you assign the variations to trigger pads, you can use the trigger pads to switch between the variations.

PROCEDURE

1. Right-click a variation button, and select the trigger pad on the **Assign Variation to** submenu.
 2. Repeat this procedure for all the variations that you have created.
-

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