KODAMO®

ESSENCEFM

User Manual

English

Other languages and PDFs available at kodamo.org

Welcome to the Kodamo EssenceFM! Thanks for purchasing our instrument, which represents a new vision of FM synthesis. We always were focused on making the EssenceFM "musician oriented", aiming for reliability and comfort of use in every situation.

This manual was written to offer you the best experience you'd get from the EssenceFM. We recommend to read at least the first section and store this handbook preciously in case you want to get further information.

Main features

- 300-voice polyphony, 6-operator FM sound generator
- 16-part (MIDI) / 300-voice multitimbral
- 6-point loopable envelopes
- Free Algorithm and Envelope Design
- 8-cord Modulation matrix with 138 sources/228 destinations
- 24 user-editable Waveforms
- 2 independent Multi-Effect DSPs
- Powerful Voice Sequencer

Safety Precautions

- Use only the supplied power adapter.
- Ensure your outlet is properly grounded.
- Do not cover the vent holes to prevent overheating.
- Do not open the device.
- Do not expose the device to water or any kind of liquid. If this happens, immediately turn it off and unplug it, then put it in a warm place. Try turning it on again only when it's completely dried.
- Do not use the device in excessively hot environments (>40°C).
- Do not put any heavy objects on the device or put too much pressure on the touch screen, it could be easily damaged.
- Ensure the device is in a stable position before using it.
- Never power off the device when you are saving.

Please regularly save your data to a USB storage device (see Global > Storage). Like on most synthesizers, a power loss while saving may corrupt your sounds!
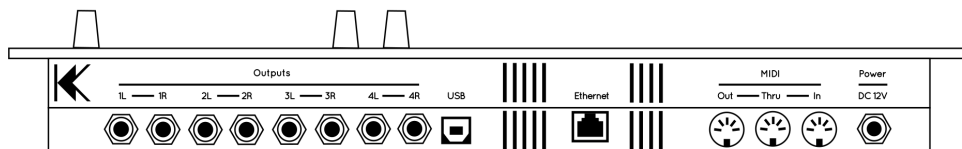
Table of Contents

Making connections

It's the moment to plug your EssenceFM!

Back panel connectors are described below, from the left to the right:

- Audio Output Pairs 1 to 4 (¼ inch / 6,35 mm TRS phone jacks): Each pair can operate as a stereo output (see Effects and Routing section). Each output delivers a balanced signal, but still can be connected to an unbalanced TS jack.
- USB (Type B): Connects to a host system for USB-MIDI transmission.
- Ethernet (RJ45): Connects to a network to carry MIDI-RTP packets.
- MIDI Out (DIN): Connects to any MIDI instrument to be controlled by the EssenceFM.
- MIDI Thru (DIN): Outputs (repeats) any MIDI data fed into the MIDI In port.
- MIDI In (DIN): Connects to any MIDI controlling device (e.g. master keyboard, synth, sequencer, computer MIDI interface, wind controller, etc.)
- DC Power supply: Connects to the supplied DC 12V power adapter.
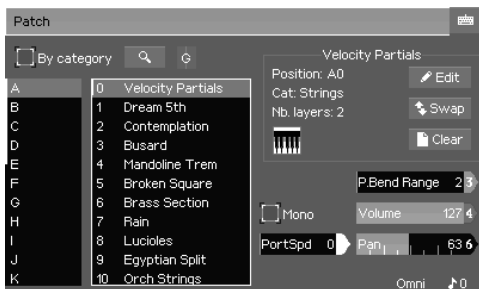
Let's play!

When powered up, the EssenceFM starts in Patch mode by default, letting you play with its preset patches.

Just scroll down the list and select a patch by pressing on its name to use it.

There are also Voice presets, that can be accessed by going into Voice mode (see next section).

The EssenceFM power resides into its structure, smaller elements are stacked to make big ensembles. Let's familiarize with it.
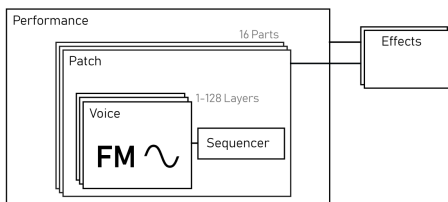
Voice: A Voice is the smallest element that the EssenceFM uses: a 6-op FM sound.

Patch: A Patch is gathering one or more voice(s), by stacking, layering, sequencing them together and adding effects.

Performance: A Performance assigns a patch to each MIDI channel, store effects, routing settings and much more. It allows multitimbral operation. In this mode the effects are shared, ignoring patch effect settings.

Introducing the Front Panel

The EssenceFM's front panel is based on the combination of a large touchscreen and hardware controls. Hardware controls provide a quick access to the most common features.
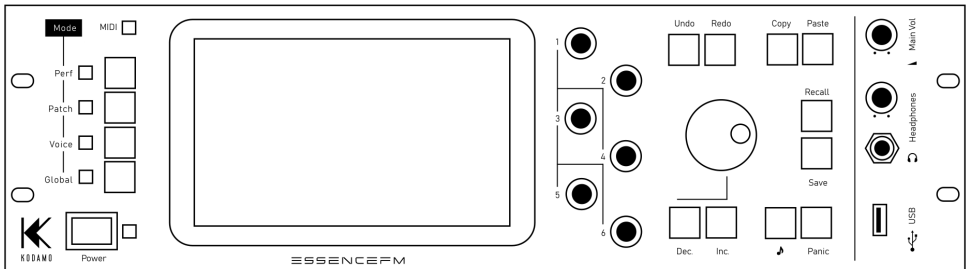
MODE KEYS	These keys provides direct access to the associated modes.
- **Performance**	See the Performance/Patch/Voice/Global sections to know
- **Patch**	more about them.
- **Voice**	
- **Global**	

MODE LEDS

An LED near each mode key tells the current active mode. When the Global mode is entered, the previous mode LED (Performance, Patch or Voice) still lights up since those modes keeps running in background. You can think of the Global mode as a virtual mode, not affecting the sound or the behavior of the synth, only providing access to global parameters.

DATA ENTRY

- **Direct Access knobs:** Those 6 knobs are used for the Direct Access feature

described below, except on the main page of the Performance mode, where they act as real-time MIDI controllers.

- **Main Dial**: Modifies the focused element on screen (which will be detailed in the next section).
- **Inc / Dec:** Works in the same way as Main Dial (increments and decrements value).

EDITION KEYS

Copy: Copies the focused element into the clipboard for further use.

Paste: Puts the clipboard contents into the focused element.

Undo: Discards the last operation, up to 1000 times. Leaving a page resets the undo/redo history. Most operations are undoable: Voice parameters, algorithm arrangements, patch parameters, waveform editing... Only the operations on general pages are usually not undoable (clearing an item, swapping an item, doing a copy-paste operation in the voice/patch/performance/tunings/waveform list...).

Redo: Restores the previously discarded operation.

Save: Saves the current element into the internal memory. Apart from some global settings, an element is never automatically saved when edited, moved or overwritten. Pressing Save on a general page (e.g. Patch list) will open a popup allowing you to save specific elements or to save them all. Pressing Save a second time will save all the modified elements, exactly like if you pressed "Save All".

Recall: Reloads the current element from its last saved state. This action doesn't clear the Undo/Redo history so you can undo a recall operation.
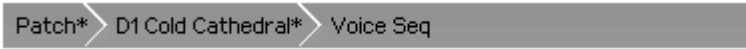
HELP KEYS

Preview (♪): Plays a few notes to quickly listen to an element without having to use a MIDI controller. To customize the preview notes, see Global > MIDI > Preview.

Panic: Stops all notes currently playing.

7

User Interface Elements

The EssenceFM user interface is organized into pages.

Patch* > D1 Cold Cathedral* > Voice Seq

A breadcrumb located at the top of the screen always shows were you are in the page tree.

After pressing a mode key, the main page of the mode is displayed at the leftmost, then you can access more sub-pages from it.

You can navigate back at any time by pressing on a page name.

Note the asterisks (*) on some pages. That means this element was modified but not saved. When the asterisk is on a general page (like the Patch list, Voice list, Performance list), it means there is one or more modified/unsaved elements.

If you are not familiar with computers and user interfaces, here is a description of the elements found in the EssenceFM :

Focus notion: Focus is the graphical representation of which element is currently editable, it's represented by a pink frame surrounding the element. A focused element is directly editable by turning the Main Dial knob, pushing INC/DEC keys, and is eligible to a COPY/PASTE operation.

Default Value 27 1
Default Value 33 2
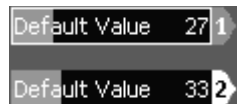
Direct Access feature: The 6 knobs located on the right side of the touchscreen allow you to edit values without the need to focus the element. Elements concerned by Direct Access are always flagged with the associated knob number, like on the picture above ("1" and "2" flags). All sliders and envelope points can be edited this way (see Envelope Editor chapter).

Popup: A window that appears in front of the page. Often for confirmation purposes, or to show more parameters after pressing a button.

MIDI MPE ✕
Set all parts to patch Orch Strings?
Cancel OK
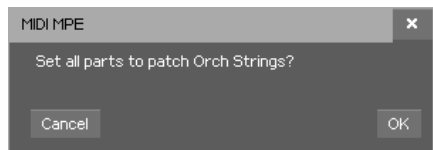
Button: Pressing it triggers an action, like a physical key does.

Slider: Allows to set a value. Simply drag the slider horizontally to change its value. You can also enter a numerical value by using the virtual keypad that shows up at the top right corner of the screen.

List: Allows you to select an element in a list. You can swipe it vertically to quickly scroll across the elements, or slowly move your fingertip to reach precisely what you are seeking. Any element can also be accessed by entering its index with the virtual numerical keypad (by pressing on the keypad button after it's focused, like the slider).
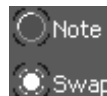
Text field: Allows you to enter text data (e.g. patch name). Pressing it opens the alphanumeric virtual keyboard.

Checkbox: Controls a parameter that can be activated (checked) or deactivated (unchecked).

Radio Button: Allows to make a choice between several options. Unlike checkboxes, radio buttons are at least two, and only one can be selected at a time into a set.

Tab field: Splits interface elements into several tabs, which are like small pages. Press on its header to access its contents. The current active tab has a lighter color and is offset compared to the others.

First steps

Introducing FM synthesis

FM stands for "Frequency Modulation". A waveform is multiplied ("modulated") with another one to create a new sound. It's the same as vibrato, except that it is much faster, so much that it sounds like a different timbre to the ear, rather than a quick vibrato.

If you're familiar with the subtractive synthesis used in analog synths, FM is quite the opposite: you usually start from sounds with low harmonic content (e.g. a Sine Wave), that once modulated will create more harmonics.

The new harmonics, sometimes called "Partials", depends on the frequency ratio between the carrier (the base sound) and the modulator (the one modulating the carrier's signal).
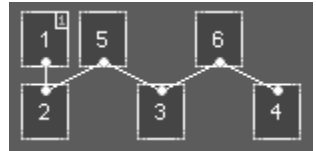
In FM synthesis, a block generating sound is usually called an Operator, and the Operator arrangement is called an Algorithm.

An FM Algorithm is usually represented as below, and is to be read from top to bottom.

When an operator is feeding its signal into another one under it (1, 5 and 6) it is called a *Modulator* -you don't hear its direct sound-, while operators at the bottommost (2, 3 and 4) are *Carriers*.

Changing the volume of a carrier will effectively change your sound's volume, but doing the same thing on a modulator with modify the harmonic content of the sound. This is where the power of FM synthesis resides! Coupled with envelope generators, harmonic content that changes over time is easily achieved.

There may be several modulators for one carrier, in this case their output is simply summed before the modulation happens (additive synthesis). Or there may be a modulator modulating several carriers, in that case its output is simply sent to each carrier.

The operator 1 has a small number on its top right corner indicating its feedback source. A feedback is simply another link between two operators, except that it can feed into itself (which is the case on the picture above). This is used to alter the tone of the operator, providing more and more overtones as the feedback level is increased. It can be used as a noise source when pushed to the max.

The quickest way to learn FM synthesis is by looking at existing sounds. Go into Voice mode, select one from the list and press "Edit" to see how they work and try modifying them.

FM synthesis has the big advantage of being really fun to work with - after about 10 years experimenting with it, we are still surprised by the variety of sounds we can get from it.
We hope you'll like it as much as we do!

Sound design tips
Start with a single audible operator (mute the others), then build your sound from that point, by adding operators as you need them. Instead of using a single modulator with a very high volume, try using several of them chained in different ways, with a lower volume to achieve a more refined sound.

When trying to achieve a particular sound, try to split it into several sub-sounds to make them easier to manage. For example, for a pan flute, you may want to create a short noise attack sound and a sustained square-like sound.

Use the sine wave first. They are the most flexible and useful in FM synthesis. Use other waveforms with care, as their aliasing limit is easily exceeded. You will find that some waveforms are well suited to some instruments (like the Square wave for cymbals, or the HSine for bowed strings).

When you have a good sound that is just a bit "thin" sounding try detuning an operator ("Fine" parameter) to create a rotating phase shift. If the wobbly effect isn't appropriate, try overlapping two instances of the voice in Patch mode instead, with a slight detune to one of them. Also don't underestimate the effects, some chorus or phaser may do wonders.

Basic workflow

To make the sound creation process easy, we suggest to always start by creating a Patch (either in Patch mode or in Performance mode).

Then when you are in the Patch editor, assign the first layer to an empty voice then press on the Edit button to edit this voice directly. This allows you to start with a simple sound that can be improved afterwards, with other layers, effects and more.

The same results can be achieved when working in Voice mode but once you created your 6-op voice you need to go in Patch/Performance mode and create a new patch if you want to use the layers, splits, effects and sequencer.

The Voice mode is still useful for listening and editing individual FM elements without having to mute and remove effects/layers from the Patch or Performance.

Voice mode

In Voice mode you can organize, play and edit a 6-op FM voice. This mode responds to the Global Channel, see Global > MIDI configuration.
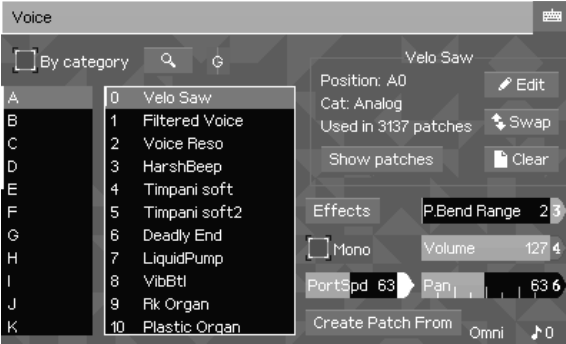
Voice List

Bank / Voice Lists: Those lists allows you to select the voice you want to play or edit in this mode

By Category: Shows the voices/patches sorted by Category instead of sorting them by Bank.

Find 🔍: Allows to search a voice by name.

MIDI activity indicator Ⓖ: Shows the Pan (light vertical bar), Volume (height), Channel (channel number or G for global channel) and MIDI activity (color) in a very compact way.

Edit: Goes into the Voice Edit Mode

Swap: Swaps the current voice with another one. Pressing this button will open a popup letting you choose the voice to swap with, and has an "Update related patches" checkbox. It's very important to keep it checked if the two voices you are swapping are used by some patches. All patches using them will be modified accordingly and are now in unsaved state (you need to save them afterwards).

Clear: Resets completely the current voice

Show Patches: Shows all patches using the selected voice. It's useful to see which patches will be affected when editing this voice.

Create Patch From: Creates a patch from the current selected voice, copying its name, category and auto-assigning the voice to the first layer of the patch.

The following parameters aren't stored within the voice, they are for playing purposes:

Pitch Bend Range (0 ~ 96): Pitch Bend range in semitone

Volume (0 ~ 127): Volume of the voice

Pan (0 ~ 127): Pan of the voice

Mono: Toggles voice to monodic play mode

PortSpd (0 ~ 127): Portamento Speed, works only when the voice is in Mono Mode

Effects: Configure the effect DSPs

Omni ♪0 **Status bar:** shows the Global Channel (1-16 or Omni) and the current polyphony used.

Voice Editor

The voice editor is split into two parts: the left part of the screen displays the algorithm, while the right panel displays parameters relative to the voice (when no operator is focused) or relative to the focused operator.
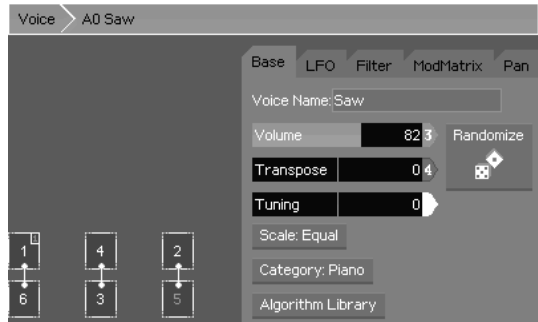
Algorithm design

The algorithm on the left side of the screen shows the operators. Their output level is displayed in real-time as you are playing, allowing you to clearly see how their envelopes are working.

There are several actions you can do on the operators via the touch screen to build your algorithm:

- Pressing an operator and releasing it (drag&drop) onto another one will connect them together. If these operators are already linked together, their positions will be swapped.

- Moving an operator always removes its bottom links.

- Releasing an operator in an empty area and it will simply fall, going to the bottom or to the nearest operator below.

- Using two fingers and pressing simultaneously two operators will link them together. It allows to create additional links that aren't always possible with the drag&drop operation.

Limitations: There can be only one operator that has more than two operators feeding into it. It can be any operator as it's managed by the engine. Additional links won't be created if you request them when the limit is exceeded.

14
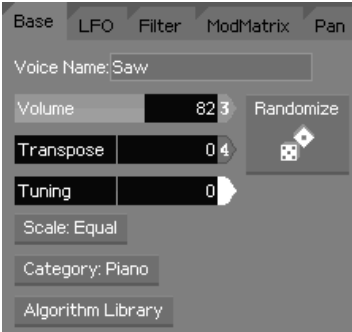
Editing voice/operator parameters

When an operator is pressed, the right panel shows the operator's parameters.

When you press the touchscreen in an empty region of the left part of the screen, the right panel shows the voice settings.

Voice settings

BASE TAB:

Voice Name: Sets the name of the voice.

Volume (0 ~ 127): Sets the volume of the voice.

**Transpose** (-36 ~ +36): Sets the semitone transposition of the voice.

Tuning (-100 ~ +100): Sets the fine tuning of the voice.

Scale: Selects the scale which will be applied to the voice (cf. Tuning section in Global Mode).

Category: Assigns a category to the voice (cf. Sorting section in Global Mode).

Algorithm Library: Selects from one of our 32 preset algorithms to help you to start creating a new voice.

Randomize: This button generates a new sound using a "smart randomized" process, in case you need some new sound ideas!
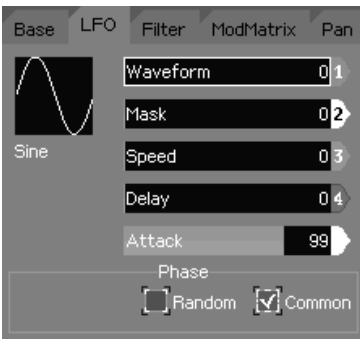
LFO TAB:

Waveform (0 ~ 23): Selects the waveform you want to use with your LFO. It's the same waveform set used into synthesis.

Mask (0 ~ 12): This mask distorts and reshape the selected LFO waveform. It doesn't overwrite the original waveform.

Speed (0 ~ 127): Sets the LFO speed.

Delay (0 ~ 127): Sets the delay between the Note On event and the LFO start.

Attack (0 ~ 127): Sets the attack rate for the LFO.

Phase Offset (0 ~ 31) *[only shown when Random and Common are unchecked]*: Sets the waveform phase offset where the LFO starts at.

Random Phase: Sets the LFO phase to a random starting point when a note is played.

Common Phase: If checked, all the notes using this voice will share a single instance of the LFO (all notes will have their LFO in sync).
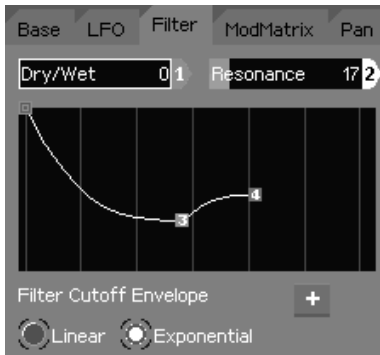
## FILTER TAB:

Dry/Wet Balance (0 ~ 127): Sets the balance between dry sound and filtered sound. A value of 64 means you've got a 50%-50% mix between dry and filtered sound.

Resonance (0 ~ 120): Set the filter resonance. Beware of loud resonant spikes if you push it to the maximum.

Cutoff Envelope: Controls the cutoff evolution over time. See Envelope Edit section to know more about manipulating envelopes.
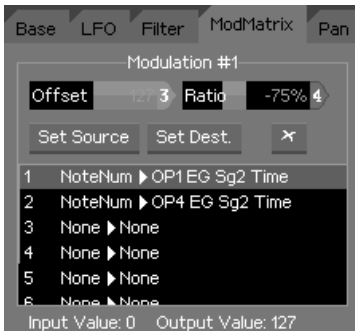
MODMATRIX TAB:

Up to 8 modulation cords can be setup for each voice. "Set Source", "Set Dest." and "x" (delete) buttons apply to the current selected modulation in the list.

Offset: Applies a positive or negative offset to the modulation source.

**Ratio**: Scales the modulation source.

Set Source: Selects the source to use (cf. source list below).

Set Dest.: Selects the destination parameter to affect (cf. destination list).

Cut cord (x): Removes the selected modulation line.

I/O value monitor (at the bottom of the screen): Allows to check, for the selected cord in the list above, the source value and how the Offset and Ratio amounts are affecting it. It's useful to fine tune your Offset/Ratio values according to what you are sending into the modulation matrix.

Modulation Matrix Sources	Modulation Matrix Destinations	
Note number Velocity Release Velocity Aftertouch Poly. Aftertouch Pitch Bend LFO Note count RNG Envelope (any) Control Change (any)	Volume Freq. Coarse/Fine LFO Speed LFO AM/FM Depth LFO Waveform/Mask Flt Reso/Cutoff FltEG Speed FltEG Sg1-5 Time FltEG Pt1-6 Y PanEG Speed PanEG Sg1-5 Time PanEG Pt1-6 Y Feedback Src Feedback Lvl	Volume Freq. Mult Freq. Coarse Freq. Fine Waveform Initial Phase LFO AM/FM EG Speed EG Sg1-5 Time EG Pt1-6 Y PitchEG Speed PitchEG Sg1-5 Time PitchEG Pt1-6 Y
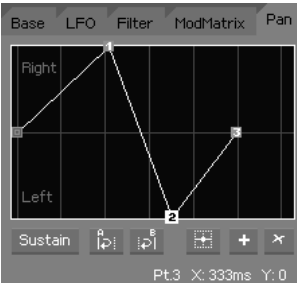
PAN TAB:

This envelope controls the voice panning over time. See Envelope Edit section to know more about manipulating envelopes.

On the EssenceFM, panning is averaged when nested elements have different pannings (e.g. a Patch panned to the left using a Voice panned to the right will sound centered).
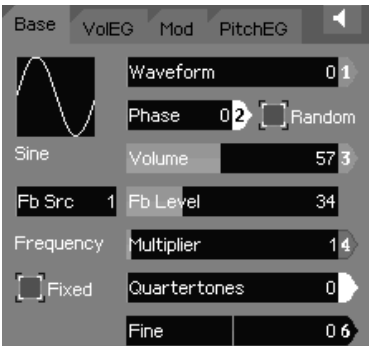
Operator settings

BASE TAB:

Waveform (0~23): Sets the waveform to use for the selected operator. See Waveforms section in Global mode to know how to edit and customize those waveforms.

Phase (0~31): Sets the initial phase where the waveforms starts at.

Random Phase: Use a random number generator to set the initial phase.

Volume (0~127): Sets the operator's volume.

Feedback Source (1~6) *[OP1 only]:* Selects which operator output will be fed back into OP1.

Feedback Level (0~127) *[OP1 only]*: Sets the level of the feedback loop.

Fixed: Toggles between Fixed or Multiplicative operator frequency mode. In Multiplicative mode, it follows MIDI note frequencies with multiplier applied to it, while in Fixed mode, it stays always the same.

Multiplier (0~40) *[only in Multiplicative mode]*: Sets the operator frequency multiplier. Original frequency depends on incoming MIDI note pitch.

Quartertones (0~24) *[only in Multiplicative mode]*: This parameter allows you to set the operator frequency by quarter-tone steps.

Fine (-100~+100) *[only in Multiplicative mode]*: This parameter allows you to fine tune the operator's frequency.

Freq. Multiplier *[only in Fixed mode]*: Sets the base multiplier for the fixed frequency. Available values are 0.1, 1, 10 and 100

Freq. Fine (0 ~ 255) *[only in Fixed mode]:* Sets the operator frequency according to the multiplier above.

Frequency indicator *[only in Fixed mode]*: This number shows you the operator actual frequency in Hertz. It's useful to accurate the two previous parameters.
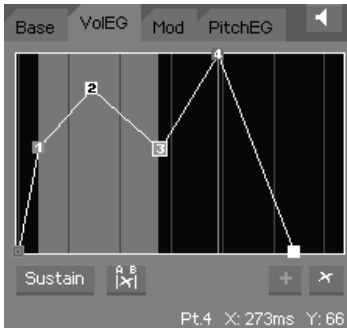

VOL EG TAB:

This envelope allows you to control the operator's volume during time. See Envelope Edit section to know more about envelope manipulation.

If the selected operator is a carrier, you should end its envelope with a value of zero, otherwise the voice will never stop playing. Simply press the panic button if a note is stuck.

Tip: to quickly get the same envelope on different operators simply focus the envelope, press Copy, select another operator then press Paste.

**A whole operator can also be copied if you press Copy when the operator is focused.**

18
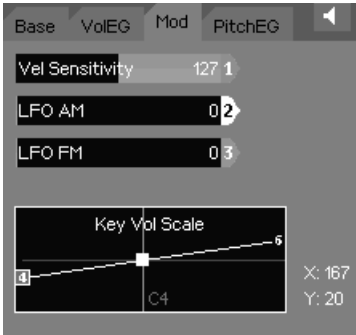
MOD TAB:

Velocity Sensitivity (-127 ~ +127): Sets how the operator volume is affected by note velocity. A value of zero means the operator's volume is always as defined by the Volume parameter in BASE tab. As you increase its value, low velocities can scale its volume down more and more.

LFO AM: Sets how much the LFO affects the current operator's volume.

LFO FM: Sets how much the LFO affects the current operator's frequency.

Key Vol Scale: This curve allows you to set the operator key scaling. It scales the operator's volume according to the MIDI note number. There are 3 parameters: Lower volume, Center note, and Upper volume. The two (upper and lower) volumes represents the amount at bottom and top of your MIDI keyboard. The center note parameter sets the root of those two curves.
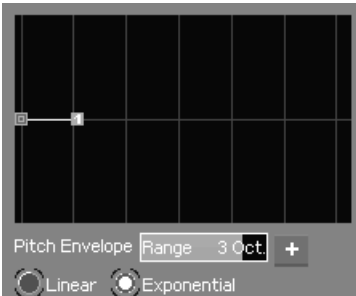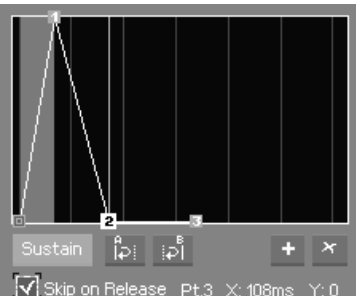

PITCH EG TAB:

This envelope allows you to control the selected operator pitch over time. See Envelope Edit section to know more about manipulating envelopes.

Pitch EG Range (shown when no point is selected): This value sets the Pitch EG maximum value. Available ranges are Tone, Quint and 1 to 4 octaves.

**Other parameters**: See next section (Envelope Editor)

<u>Envelope Editor</u>

The envelope editor is quite different from those you can find in other synthesizers. Instead of the classic ADSR it's made of points that can be placed freely to create any curve. Each envelope segment is delimited by 2 points, you can drag them to adjust their horizontal and vertical position. There are other ways


19

to adjust point positions:

– Main Jog Wheel and INC/DEC keys for the vertical position

– Knobs for the horizontal position
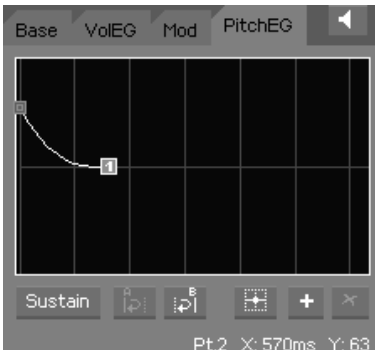
The horizontal zoom can be adjusted by pinching with two fingers.

Note about the time scale: to allow you to easily create short and long envelope segments without requiring huge amounts of zooming/scrolling, we adopted a logarithmic time scale. A segment that is 2 times shorter than another will play much quicker than what you would expect if the scale was linear.

Note about decay reaching Zero and Release time: this case is impossible to represent correctly with a single graphical curve. To compensate for that the EssenceFM uses the last segment as the release length (points 1 and 2 in this picture). That means if your envelope decays to zero and you want to have a release time in case the player release the key quickly, you need to add another segment representing this release length. It works only with exponential envelopes.
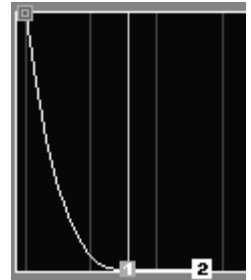
Envelope controls are described below:

Add Point (+): Add a new point after the selected one.

Delete Point (x): Remove the selected point.

Center Point (Pan & Pitch EG only): Centers vertically the selected point on the axis.

Sustain Point: Attach sustain to the selected point. The envelope will be stuck on this point until the key is released.

Skip on Release (only shown when Sustain Point is selected): If checked, when the note is released before reached the sustain point, the envelope value will jump to this point.

Segment Loop A / B: Sets the Loop Start and Loop End points of a segment loop, which can take in several segments. Loop must be set before the sustain point to work.

Remove Loop (only shown when a point with loop is selected): Removes the Loop Start and Loop End markers.

Linear / Exponential (only shown when no point is selected): Sets the envelope in Linear

or Exponential mode.

Selected Point Information: On the page bottom line, selected point coordinates are shown to help you adjusting them.

The currently selected point can be adjusted via hardware controls: the main jog wheel sets its horizontal position, while INC/DEC keys sets its vertical position.

The Direct Access knobs adjust the horizontal position of the corresponding numbered points.
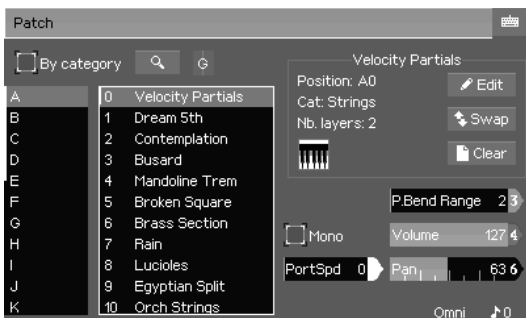
Patch mode

In Patch Mode you can organize, play and edit Patches. This mode responds to the Global Channel, see Global > MIDI configuration. When going into Patch Mode, the first page displayed is the Patch List.

Like in Voice mode, parameters on the Patch List page aren't saved into any patch (Pitch Bend Range, Volume, Pan…).

"Edit" brings you to the Patch Editor.

"Swap" swaps the current patch with the patch of your choice. Pressing this button will open a popup that has an "Update related performances" checkbox. It's very important to keep it checked if the two patches you are swapping are used in a performance. All performances using them will be modified accordingly and are now in unsaved state (you need to save them afterwards).

"Clear" clears the current patch.
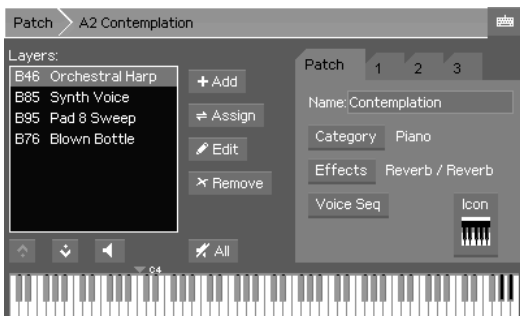
Patch editor

Layer management

Layer list: All voices layered into the current patch are listed here. It allows you to select the layer you want to work on, whose parameters are on tabs 1 to 3.

Add Layer (+): Adds a new layer

based on the previous element.

Assign Layer: Assigns a voice to the selected layer.

Edit Layer: Opens the selected layer in the Voice Editor. You can edit the voice and hear it in context, but beware that any modification impacts all patches using the same voice.

Remove Layer (x): Removes the selected layer from the patch. It doesn't delete the original voice.

Move Layer up: Puts selected layer before the previous element in the list.

Move Layer down: Puts selected layer after the previous element in the list.

Mute Layer: Mutes the selected layer. This setting is stored into the patch.

Mute All: Toggles mute for all layers.

Patch settings

PATCH TAB:

Name: Sets the patch name

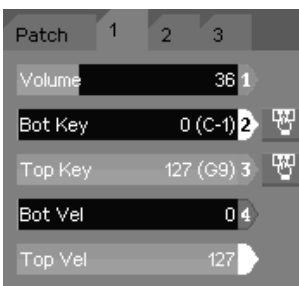**Category:** Assign a category to current patch (cf. Sorting section in Global Mode)

Effects: See the Effects section for more information.

Voice Seq: See dedicated section below

Icon: Sets an icon to your patch

Layer settings

The following parameters are relative to the current selected layer in the list.

TAB 1:

Volume (0 ~ 127): Sets the layer volume

Bottom Key (0 ~ 127): Sets the layer bottom bound note. You can use MIDI Learn button on the right to set it directly via your MIDI controller.

Top Key (0 ~ 127): Sets the layer top bound note. You can also use MIDI Learn button on the right to set it directly via your MIDI controller.

Bottom Velocity (0 ~ 127): Sets the lower velocity bound from which the layer should be

heard.

Top Velocity (0 ~ 127): Sets the top velocity bound at which the layer should be heard.

TAB 2:

Pan (0 ~ 127): Sets the selected layer pan position.

Transpose mode: In this mode, selected layer will respond to the incoming MIDI note pitch
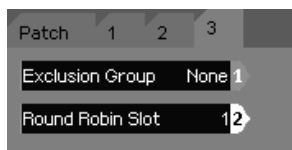
Fixed mode: In this mode, selected layer will ignore the incoming MIDI note pitch

Transpose [Transpose mode only] (-36 ~ +36): Sets the incoming note pitch offset

**Note** [Fixed mode only] (0 ~ 127): Sets the selected layer pitch

Tuning (-100 ~ +100): This parameter allows to set the note pitch really precisely.

TAB 3:

Exclusion Group (None, 1~8): Sets the Group in which all notes, from the selected layer, shouldn't be allowed to play simultaneously. For example it can be used to stop open high-hat sounds when the closed high-hat sound is played.

Round Robin Slot (1 ~ 32): This feature allows you to play the selected layer sequentially, each time you trigger a note. For example, if you've got 2 layers which are respectively in slot 1 and 2, the first incoming note will play on the first layer, the next note on the second layer, and so on.
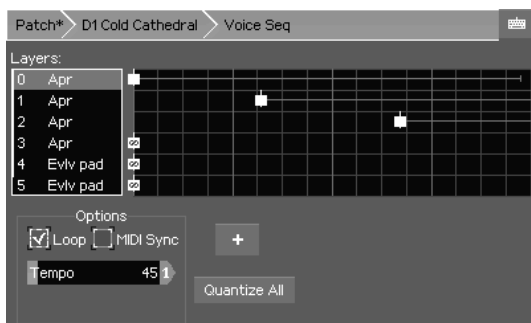
Voice Sequencer

This tool is a powerful way to make rhythmic and evolving sounds, following its own tempo or locked to an external MIDI Clock.

It basically works like any event-based MIDI sequencer, but in a simpler way.

Each layer appears like a track in which you can put one or more events.

There are two kind of events: note and swap. Note event triggers a note on the

23

corresponding layer. Swap event swaps the current FM parameters of the layer with another one (it may create strange effects depending on the sounds you are swapping).

You can add, drag horizontally, and remove any event into the sequencer grid in order to compose a sequence following your creativity!

There can be a maximum of 128 events in the Voice Sequencer, and the time grid has a 128-step resolution.

Layer List: Selects the layer you want to work on.

Sequencing Grid: The main area where you put events to build your sequence.

Loop: If checked, the sequence will play indefinitely until you release the note.

MIDI Sync: If checked, the Voice Sequencer will lock to an external MIDI clock, instead of internal tempo. Caution: be sure your sequencer (or any other MIDI controller) is able to send this kind of message when you're using this feature, otherwise your Voice Sequence won't play at all. When a tempo is received, its approximated value is shown under the Tempo slider.

Fixed Tempo [Internal Sync mode only] (1 ~ 500): Sets the internal Voice Sequence tempo

Step division [MIDI Sync mode only] (0.125 ~ 2): Sets the grid division of the sequence when synced to an external MIDI clock.

Add Event (+): Adds an event into the selected layer track.

Quantize: Puts selected event on the closer beat vertical rule.

Quantize All: Temporally aligns all events on the sequencer grid.
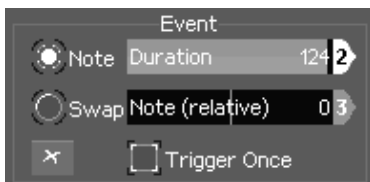
When an event is selected, a panel shows up with its parameters.

Event type (Note/Swap): Selects the current event type, which was detailed in Overview section below.

Duration [Note event only] (0 ~ 126 ; Infinite): Sets the event length, and allows to simulate a Note Off event. If set to infinite, this event won't be simulated. Note: A real Note Off event, incoming from MIDI, will always be a priority!

Note [Note event only] (-48 ~ +48): Sets the note event transposition, relatively to the incoming MIDI note pitch.
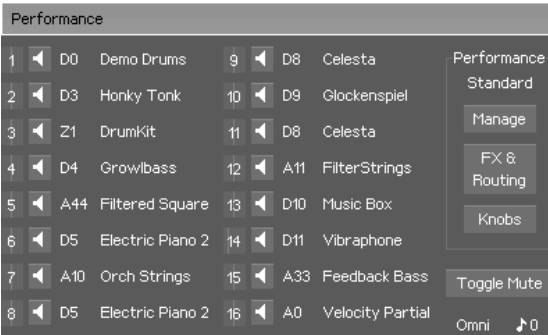
Layer Number [Swap event only]: Sets the layer to which the note will be swapped.

Trigger Once: Triggers the event only once if the sequence is looped.
Delete Event (x): Removes the selected event.

Performance mode

This is the most powerful mode in the EssenceFM, allowing up to 16 patches to be played simultaneously on any of the 16 MIDI channels.
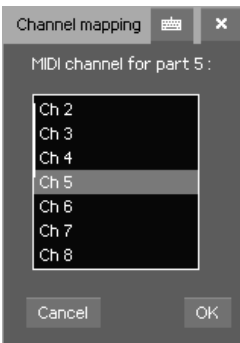

Manage: Goes to Performance Manage page, described below.
FX & Routing: Goes to Performance Effects and Routing parameters page,.
Knobs: Goes to Knob assign page
Toggle mute: Mute unmuted parts and vice-versa.

Pressing the individual **Mute** ◀ buttons mutes the selected part.

For each part, pressing the **MIDI channel number indicator** opens a popup to change it.

Keeping pressed the **part patch name** for more than a second will ask you if you want to set all parts to the same patch. It's mostly useful to create an MPE-ready performance.

Performance Manager

On this page you can manage all the 256 performances stored in the EssenceFM.

There can be only 1 active performance at a time, in this screenshot it's the first one (Current: #0 (GM)).

Performance List: One among the 256 performances can be selected here. The first 8 parts of the selected performance are displayed as a preview, at the bottom right of the screen.

Swap: Swaps the selected performance with another you select via the shown dialog.

Clear: Resets the selected performance to default.

Name: Sets the performance name.

Make Current: Loads the selected performance to use it. Only one performance can be active at the same time.

Part Editor

Bank / Patch Lists: Those lists allows you to select the patch you want to assign to the selected part

By Category: Toggle the Bank/Patch Lists into Category/Patch lists mode

Find 🔍: This function allows you to browse among patches according to a string you entered.

MIDI activity indicator: Shows the Pan, Volume, Channel and MIDI activity

Edit: This button goes into Patch Edit Mode, but you still hearing it in Performance context.

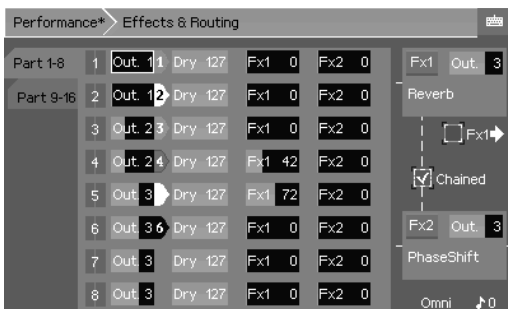**Pitch Bend Range** (0 ~ 96): Pitch Bend range in semitone
Volume (0 ~ 127): Volume of the part
Pan (0 ~ 127): Pan of the part

26

Mono: Toggles part to monodic play mode

Portamento Speed (0 ~ 127): Portamento Speed, works only when the part is in Mono Mode.

Previous / Next: Jumps to the previous or next part without having to go back to the main Performance page.

Effects and Routing

Effect levels and output routing are configured here.

For each part, you may configure:
- **Output** pair (1~4)
- **Dry** level (0~127), the amount of original sound from the FM engine
- **Fx1** send level (0~127), the amount of

signal sent to the first effect DSP

- **Fx2** send level (0~127), the amount of signal sent to the second effect DSP.

Each effect DSP can be routed to any output pair, and the effect can be selected by pressing the "Fx1" and "Fx2" buttons.
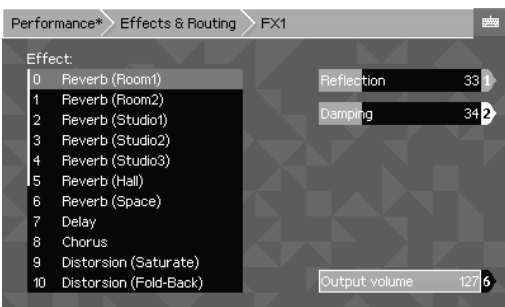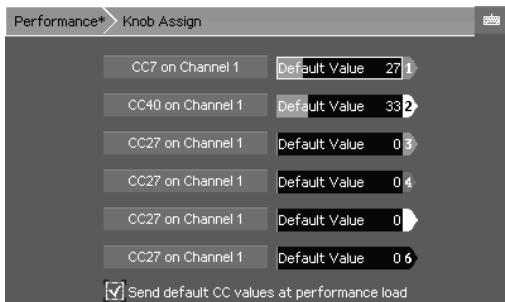

<u>Effect selection</u>

The list on the left selects the effect.

Each one has one or more parameters, displayed on the right side of the screen.

Output Volume: sets the output volume of the effect DSP.

Knob Assign

In this page, you can assign 6 MIDI Control Changes to the 6 Direct Access encoders, which will be effective when the EssenceFM is on the main Performance page. It's a powerful way

27

of controlling sound parameters in real time, if you assigned the same CCs in the modulation matrix of your Voices.

CC Assign button: The button caption shows the current CC and MIDI channel assigned to the knob. Pressing it opens a popup to change them.

Default Value (0 ~ 127): This slider assigns a default value to the corresponding knob CC.

Send Default CC Values at performance load: If checked, CCs will be initialized to their default values and send them to the MIDI output when the performance is loaded.



Global mode

All the EssenceFM's global parameters are accessible here.

When entering this mode, the current active mode (Performance, Patch or Voice) keeps running in background without any sound interruption.

MIDI and Display settings are automatically saved when leaving the page. For most other elements (Scales, Waveforms, Categories) they will appear with an asterisk when modified, so they need to be saved manually by pressing the "Save" button.
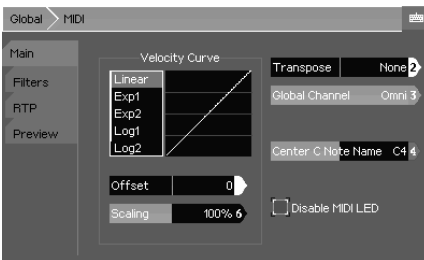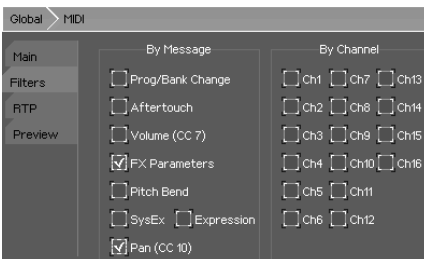

MIDI

MAIN TAB:

Velocity Curves:

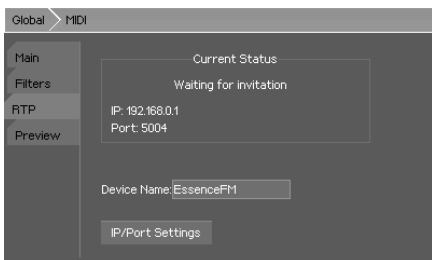**Shape**: Choose from Linear, Exponential, Logarithmic or Fixed modes.

Offset (-64~64): Vertical offset

Scaling (0~200%): Vertical scaling

Transpose (-36~+36): Global transposition, in semitones

Global Channel (1~16 + Omni)l: MIDI channel that responds to the Global Channel, which is used for Patch and Voice modes. (and Performance, if you assigned a Part to to the Global Channel).

Center C Note Name (C3~C5): Choose the center C note name according to your regional standard. This parameter is purely for display purposes, it does not affect the sound in any way.

Disable MIDI LED: If checked, disables the MIDI activity LED

FILTERS TAB:

Check a message type or MIDI channel number to filter (block) it.

RTP TAB:

Device Name: Sets the device's name which will be broadcasted on the network.

IP/Port Settings: Selects the IP addressing mode (Fixed/DHCP), IP settings (IP, Mask, Gateway) if the IP mode is Fixed, and Port number.
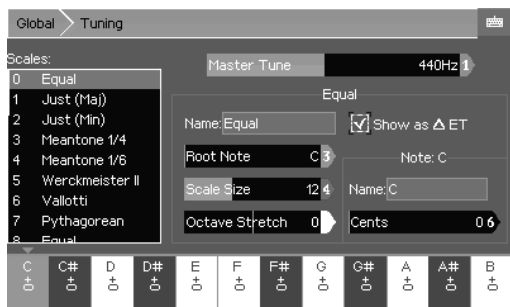
PREVIEW TAB :

Here you can configure the notes played when pressing the [♪] button. For each note there are 3 parameters:

Time (0~127): Selects the time offset when the note has to be triggered.

Note: Selects the note number.

Duration (0~127): Selects the note duration.

Preview Latch : If checked, the preview won't stop when releasing the [♪] key.

Tuning

This page provides access to the master tune setting and scale editor. Voices can choose which scale they use.

SCALE PARAMETERS :

Root Note: Base note for the scale.

Scale Size (1~32): Number of notes in the scale.

**Octave Stretch** (-50~+50): Allows to stretch the octave. Zero means each octave is double the frequency. A negative value will make it smaller, while a positive value will make it wider.

29

Show as Delta Equal Temperament: instead of showing the values in absolute Cents, it shows them relative to Equal Temperament (only relevant if scale size = 12).

<u>**NOTE PARAMETERS :**</u>

Name: The note's name.

Cents (0~1200): The note's tuning value. 1200 = frequency of the next octave.
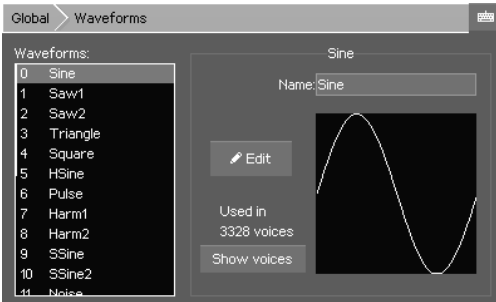
Waveforms

This page shows you all the waveforms stored in the EssenceFM.

When entering this page, current Performance/Patch/Voice modes are temporarily overridden, allowing you to play them directly from your MIDI controller.

Name: Renames the waveform.

Edit: Goes to the waveform editing page.

Show voices: Shows which voices are using the selected waveform. This is very useful as the waveforms are global to the EssenceFM - they are shared between voices. You need to be careful when modifying one, as all voices using it will be impacted.

The EssenceFM has 24 editable waveforms, it comes with 12 presets and 12 empty slots.
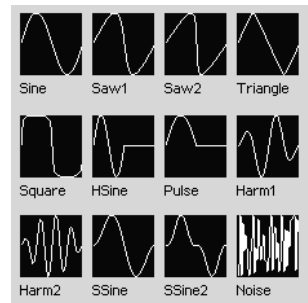
Default waveforms
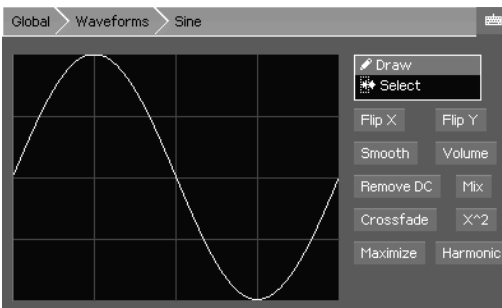
<u>Waveform Editor</u>

In **Drawing** ✏ mode, the waveform can be modified directly by pressing then moving the finger on the touchscreen.

In **Selection** ≋ mode, parts of the waveform can be selected to apply transformations only to it.

Flip X: flips the waveform horizontally.

Flip Y: flips the waveform vertically.

Smooth: smooth the waveform. Press several times to smooth more.

Volume: scales the volume, from 0 to 200%.

Remove DC: centers the waveform vertically (removes any DC offset).
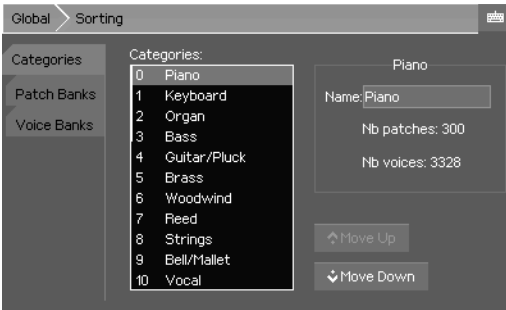
Mix: mix the waveform with another waveform.

Crossfade: smooth the waveform ends to make it seamless.

X^2: elevates the waveform to its power of 2.

Maximize: scales and centers the waveform to use the maximum amplitude.

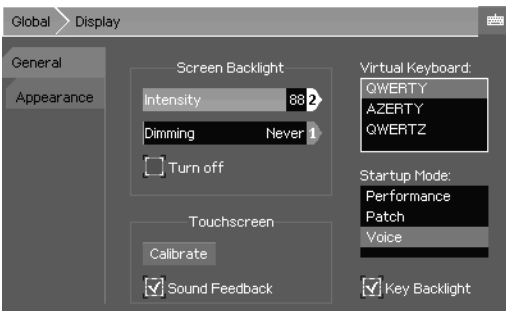**Harmonic**: adds an harmonic (0~40) to the current waveform.

Sorting

CATEGORIES TAB: Here you can organize and rename the Patch/Voice categories.

PATCH BANK TAB: To swap/clear whole patch banks. Changes aren't saved until you go to the Patch Mode and press Save.

VOICE BANKS TAB: To swap/clear whole voice banks. Changes aren't saved until you go to the Voice Mode and press Save.

Display

GENERAL TAB:

Screen Backlight Intensity (0~100): Adjusts the backlight brightness.

Screen Backlight Dimming (Never / Adjustable / Delay): Selects a delay before the display is dimmed to extend its lifetime and lower power usage.

Turn off: When checked, if Dimming is not on "Never", the display will be completely turned off instead of being dimmed.

Touchscreen Calibration: Begins the calibration process if the touchscreen default settings aren't optimal for your usage.

Touchscreen Sound Feedback: When checked, the internal buzzer will emit a "click"
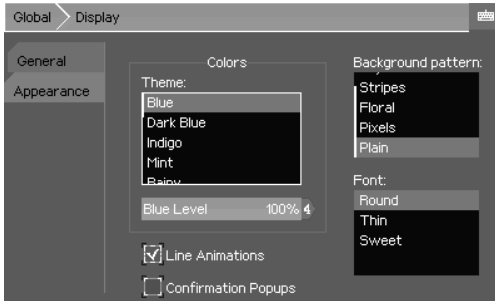
31

sound on each touch screen finger press.

Virtual Keyboard: Selects the layout used for the alphanumeric keyboard.

Startup Mode: Sets the default mode the EssenceFM boots in.

Key Backlight: Enables LED backlight under the keys.

APPEARANCE TAB:

Color Theme: Selects the color theme for the interface.

Blue Level: Adjusts the global blue level.

Line Animations: Enables line animations that are used for the lines connecting operators and the lines in the Effects page.

Confirmation Popups: Enables confirmation popups on Save/Recall/Overwrite actions.

Background Pattern: Selects the background pattern.

Font: Selects the font used on every page.
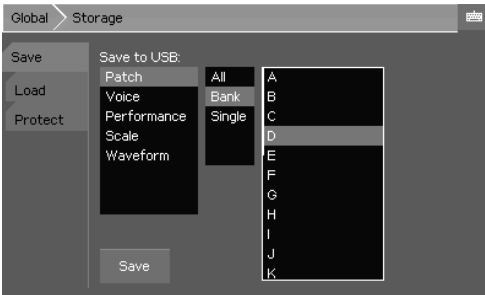
Storage

SAVE/LOAD TAB:
This page allows you to Load/Save elements from an USB mass-storage device.

PROTECT TAB:
Selects the items you want to protect from saving.

Audio
This page provides a monitoring of the allocated voice channels in the FM engine and vu-meters for monitoring the audio output.

Notes currently playing are represented by a green dot, they carry an instance of

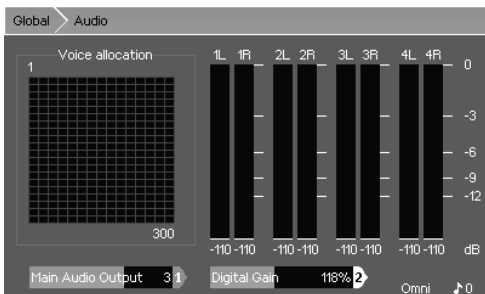the Voice Sequencer. Each allocated voice (the sequencer may trigger many of them) is represented by a white square if it's currently ON, or gray square if it's in release state.

Main Audio Output: Selects the audio output used for Patch and Voice modes.
Digital Gain: Sets the global output volume. It's useful for minimizing noise if you play quiet sounds (high digital gain), or to avoid clipping if you play lots of stacked sounds (low digital gain).
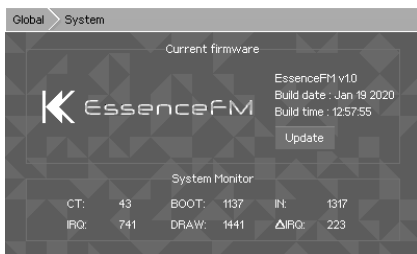
System

The current firmware version is shown on this page.
The Update button allows to upgrade the firmware via a USB drive.
The system monitor is mostly useful to us for debug purposes, if you encounter technical issues.
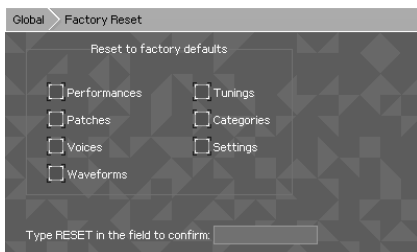
Reset

Resets the system to its original state. You can do a full reset or partial one. Reseted items can't be restored, use this feature with care!
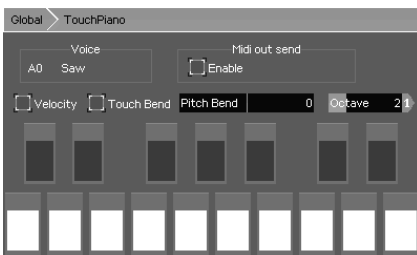
TouchPiano

Provides a small touchscreen-based keyboard, for fun or as a last resort if your controller/input fails. The current selected sound from the current mode is used. To change it, go into a mode (Performance, Patch or Voice), select a Part/Patch/Voice then go back to the TouchPiano.

Velocity: When checked, different velocities can be triggered depending on where you press the button (top = loud, bottom = quiet).
Pitch Bend: Same as a pitch bend wheel but with the touch screen.

Octave: Selects the base octave of the keyboard.

MIDI Out Enable: Sends the generate note events to MIDI out.

Automation

When you are using the EssenceFM with a DAW or MIDI sequencer, you want to be able to save its patch/routing/effects settings and recall them automatically when needed. To do so, save your performance into one of the 256 slots, then use the MIDI CC 39 and CC 40 to load the desired performance.

CC 39	Selects the performance bank : 0 (default, performances 0 to 127) or 1 (performances 128 to 255)
CC 40	Loads the performance from the selected bank. (Performance number = CC39*128+CC40)

To change effects on the fly, the following CCs are used :

CC 47 - 48	FX1 & FX2 type
CC 51 - 55	FX1 parameters 1 to 5
CC 56 - 60	FX2 parameters 1 to 5
CC 61 – 62	FX1 & FX2 output level
CC 90	MIDI channel DRY level
CC 91	MIDI channel FX1 send level
CC 92	Effect routing mode 0 = parallel 1 = chained 2 = chained + FX1 listen
CC 93	MIDI channel FX2 send level
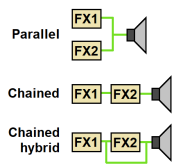
All of these CCs except 90, 91 and 93 are global so they can be sent on any MIDI channel.

Effect List

Each effect DSP can be setup to do the effects below. Effects parameters are listed in the

right order for use with the CCs detailed above.

N°	Effect name	Effect parameters
0	Reverb (Room1)	Reflection (0 ~ 124), Damping (0 ~ 127)
1	Reverb (Room2)	
2	Reverb (Studio1)	
3	Reverb (Studio2)	
4	Reverb (Studio3)	
5	Reverb (Hall)	
6	Reverb (Space)	
7	Delay	Delay L (0 ~ 127), Delay R (0 ~ 127), Feedback (0 ~ 120), Cutoff (0 ~ 127)
8	Chorus	Speed L (0 ~ 127), Speed R (0 ~ 127), Depth (0 ~ 127)
9	Distortion (Saturate)	Threshold (0 ~ 127), Gain (0 ~ 127), Cutoff (0 ~ 127)
10	Distortion (Fold-Back)	
11	Distortion (Halved Negative)	
12	Distortion (Positive)	
13	Distortion (Abs)	
14	Bitcrush	Frequency (0 ~ 127), Bit Reduction (0 ~ 127), Cutoff (0 ~ 127)
15	Ring Modulation	Speed (coarse) (0 ~ 127), Speed (fine) (0 ~ 127)
16	Phaser	Speed (0 ~ 127), Depth (0 ~ 127), Frequency (0 ~ 127)
17	Rotary	Rotor speed (0 ~ 127), Stereo Depth (0 ~ 127), Distortion (0 ~ 127)
18	Equalizer	Low Freq (0 ~ 127), High Freq (0 ~ 127), Low Gain (0 ~ 127), Mid Gain (0 ~ 127), High Gain (0 ~ 127)
19	AutoWah	Speed (0 ~ 127), Cutoff (0 ~ 127), Resonance (0 ~ 100), Depth (0 ~ 127)
20	Phase Shift	Left (samples x10) (0 ~ 127), Right (samples x10) (0 ~ 127)

Troubleshooting

Problem	Solution
Some notes are stuck active and I can't stop them	Press the "Panic" button. Check if there are any unterminated volume envelopes in the Voices you are using (the last envelope point of each carrier should be set to zero).
I have some voices and patches marked as "Corrupted" instead of their original name	Your probably had a power loss while pressing "Save". If accessing those elements crashes the device, clear and save them ("Clear" button on the Voice List and Patch List pages) . Unfortunately, corrupted elements can't be restored. If your electrical network isn't very reliable, we suggest regularly saving your work on a USB drive.
I can't hear any sound as I play	In Patch and Voice modes, check that the Main Audio Output parameter (found in Global > Audio) is set to the output jacks you are plugged into. For Patch and Voice modes, check that you are sending MIDI events on the Global Channel, which can be configured in Global > MIDI. In Performance mode, check that there is at least one Part assigned to the MIDI channel you are using, check that this part is routed to the right jack output ("FX & Routing" button), check that it isn't muted or has its volume set to zero. For all modes, check that your controller isn't sending MIDI expression CC with a null value. Press the Panic button to reset it to its maximum value. By going to the Global > Audio page you can see if there is audio signal generated, so you know if the issue is on the software or hardware side.
When I hit Play on my external sequencer, my part settings get modified	This happens if your sequencer sends a GM reset command or other MIDI channel settings like Volume, Pan, Pitch Bend Range etc. You basically can work in two different ways: • Use your sequencer to setup the whole

| | performance (do not edit channel settings directly on the EssenceFM as they'll be overridden)
• Configure your performance on the EssenceFM and remove any unwanted message from your sequencer using the MIDI filters (see Global > MIDI) |
|---|---|
| My USB drive isn't detected | Check it is FAT32 formatted. NTFS isn't supported. |
| I plugged a MIDI-USB device on the front port, but nothing happens. | MIDI class-compliant devices are supported but hot swap isn't. You need to plug it in and power up the EssenceFM after. |
| I found a software issue and want it to be fixed | Alright! Please describe the problem and how to reproduce it by writing at contact@kodamo.org.
A fix may be released for the next firmware version, so you can upgrade it when available. |
| I sent tons of MIDI events triggering complex patches and now the sound is glitchy | There is a lot of CPU power to handle everything, but you may find cases where it can be overwhelmed. Such a case may happen by sending hundreds of notes within a second, each one triggering dozens of notes at the same time via the Voice Sequencer. If this happens, no worries, it doesn't do anything harmful - but you need to restart your EssenceFM to fix the glitchy sound. We suggest trying a different approach in your sound design to achieve the same effect in a more efficient way. |
| After updating the firmware, the synth doesn't boot anymore. | This may happen if you suffered from a power loss while upgrading the firmware. Please contact us, we'll explain you the procedure to restore it. |

Warranty

The EssenceFM is sold with an included 2-year manufacturer's warranty, allowing two workshop returns in case of a defective product.

Normal wear and damage caused by the user are not covered: liquid damage, impacts, electrical surges, use of the wrong wall adapter, use in high-temperature environments (>40°C) or any other inappropriate use for an electronic device.

If you need to return the product under warranty, please send us an email (contact@kodamo.org) describing what happened and we'll send you the procedure.

Maintenance and Care

To clean up your EssenceFM, use a soft piece of cloth. Knobs can be pulled up to make it easier to clean.

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