erica synths

GRAPHICVCO

USER
MANUAL

www.ericasynths.lv

THANK YOU FOR PURCHASING
ERICA SYNTHS GRAPHIC VCO! WE
BELIEVE. THIS WILL BE ONE OF
YOUR FAVOURITE MODULES IN YOUR
EURORACK SYSTEM.

The Graphic VCO allows you to draw your own waveforms, arrange them in wavetables and wavetable banks, morph between two selected waves and alter the resulting wave in advanced ways (FXes) – apply FM, phase distortion, ring modulation, wavefold/wavewrap, bitcrush. Waves, wavetables, FXes and other settings can be saved and recalled from the memory instantly. The module has two outputs – the main output and the output with configurable suboscillator.

FEATURES

› Versatile waveform design
› Morphing between two selected waves
› Wavetable design
› Wavetable matrix design
› Versatile waveform alteration – FM, phase distortion, ring modulation, wavefold, wavewrap, bitcrush
› Configurable suboscillator output
› Skiff-friendly design

SPECIFICATIONS

› Audio output amplitude	10Vptp
› Octave range	C0 – C8
› Sample rate	96kHz
› Wave resolution	1024 points
› Unipolar CV input range	0 - +10V
› Bipolar CV input range	-10V - +10V
› Panel width	16HP
› Module depth	30mm
› Power consumption	152mA@+12V, 20mA@-12V

THE LCD gives visual feedback on the main functions of the module.

THE LEFT ENCODER allows to access main functions in the menus.

THE RIGHT ENCODER allows to access secondary functions in the menus.

BACK button allows to return to the menu above

ADJUST MASTER TUNE of the VCO. Tune range is 16Hz - 4kHz, larger range can be achieved with CV applied to 1V/oct input

ADJUST FX (depending on selected function) amount manually. If FX AMT CV is patched, this knob becomes FX amount CV attenuator.

DEPENDING ON FX selected, this knob **ADJUSTS THE FX PARAMETER**, for example, FM frequency, if FM is selected. If FX CV is patched, this knob becomes FX CV attenuator. In Wavetable Matrix mode use this knob to morph thru waves in horizontal direction.

THIS KNOB allows you to **MORPH** between wave A and wave B manually. If MORPH CV is patched, this knob becomes MORPH CV attenuator. In Wavetable Matrix mode use this knob to morph thru waves in vertical direction.

THIS IS 1V/OCT INPUT It accepts CVs from 0V to +8V for 8 octave tuning

THIS IS FX AMOUNT CV INPUT. It's unipolar and accepts 0 – +10V CVs

THIS IS FX PARAMETER CV INPUT. It's bipolar and accepts -10V - +10V CVs. In the Wavetable Matrix mode this CV input selects waves in horizontal direction

THIS IS MORPH CV INPUT. It's bipolar and accepts -10V - +10V CVs. In the Wavetable Matrix mode this CV input selects waves in vertical direction

THIS IS THE MAIN OUTPUT OF THE MODULE

THIS IS THE CONFIGURABLE SUBOSCILLATOR/MIX OUTPUT

> THE MAIN MENU <

This is the **MAIN WAVE DESIGN** menu. It will change depending on the mode selected

This is **MODE SELECT** menu. Selected mode appears as a text below the icons

This is OSCILLOSCOPE and **PLAYBACK MONITORING** menu
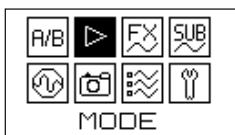
This is **SNAPSHOTS LIST** menu

This is **FX MANAGEMENT** menu

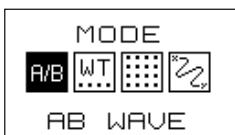This is **WAVE** and **WAVETABLE LIST** and **MANAGEMENT** menu

This is **SUBOSCILLATOR CONFIGURATION** menu

This is **THE MODULE SETUP/CONFIGURATION** menu

> MODE SELECT MENU <

Let's start with **SELECTING OPERATING** (playback) **MODE!** Use the left encoder to navigate thru screen and push the encoder to confirm the selection.

The Graphic VCO has **THREE MAIN MODES:**
1. Morphing between waves A and B
2. Wavetable
3. Wavetable Bank Matrix

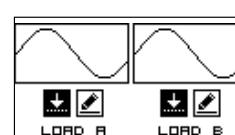Use the left encoder to navigate thru mode icons and push the encoder to confirm the selection.

> WAVE DESIGN MENU <

The **BASIC MODE** is **WAVE DESIGN** and Morphing between waves A and B. In this mode you can use encoders to draw two waves – A and B (or select ones from the list) and morph between them manually or via Morph CV, thus getting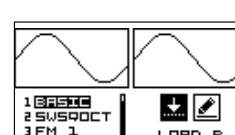 interesting in-between waveforms. Futuremore, you can alter the wave by applying FXes - frequency modulation, phase distortion, ring modulation, bitchrush, etc.
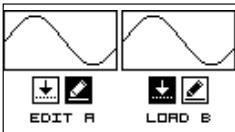Note that FXes are master settings, and they alter the signal before the output.
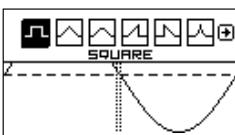Use the left encoder to navigate to A/B and push the encoder to enter the wave design mode.

In Wave design mode you can select A and B waves from the list OR **DESIGN NEW WAVEFORMS**. The easiest way is to load some waveforms from the lists and morph between them.

To do so, click the left encoder on the **LOAD** icon to load the waveforms in the left window and click the right encoder to load waveforms in the right window.
Use the left and the right encoders to navigate thru the list of A and B wavetables correspondingly and click to confirm selection then repeat the same to chose the waves form the list within the wavetable. Once waveforms are loaded, you can choose to edit them. Editing waveforms is similar to drawing a new waveform as described below.

Once waveforms are loaded, you can just **PLAY THEM BACK** or **EDIT** them. Rotate left or right encoder to select edit icon and click to advance to wave edit mode.
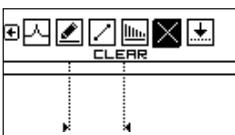
In the wave edit mode you'll see the waveform and by PUSHING THE LEFT encoder, you'll access the wave edit menu on the top of the screen. Rotate the left encoder to access wave edit options! **Editing waveforms is similar to designing the new one – please, refer to procedure below.** Particularly interesting is wave editing via managing amplitudes of harmonics.
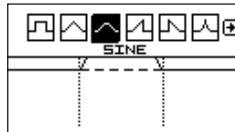If you wish to save the waveform after editing choose the far right icon and click the encoder to confirm.

The name screen will appear and you can name the waveform. It will be saved as the last in the waveform list. See the Waveform and wavetable management procedures below.
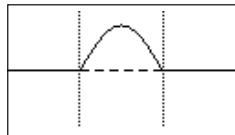
To **DRAW A NEW WAVEFORM**, load any waveform, select edit mode, delete the wave and start design from scratch. Or select NEW in the MANAGE menu.

Once you have clear screen, you can draw one period of the wave and simultaneously listen to the result. To do so, use the left encoder to select the principal waveform, you wish to start with, from the icons above and click to confirm selection. Available principal waveforms are pulse, triangle, sine, ramp, sawtooth and logarithmic sine. Example shows sine waveform selected.
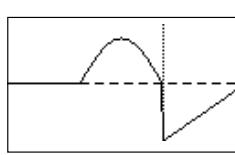
Once the waveform is selected, you can start designing a wave. There's a marker on the beginning of the horizontal axis.
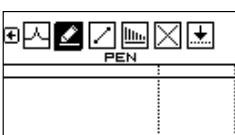Rotate the left encoder to move the marker right or left. Push promptly and rotate the right encoder to split width of the selection. Now you have two options:
1) Rotate the left encoder to move selection right or left,
2) Click the right encoder and rotate it CW to draw the positive cycle of the sinewave or CCW to draw the negative cycle of the sinewave.
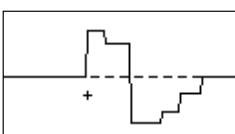
Now you can rotate the left encoder to move same marker selection left or right or click the right encoder and change the width of the selection.
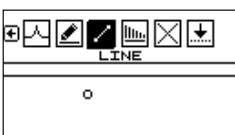You can click the left encoder to access the top menu and select different principal waveform (pulse wave is selected in the example on the left). Repeat steps above until you are happy with your unique waveform. You can save it to the waveform list – see instructions below!
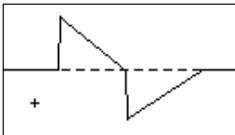
In the **PEN SKETCH** mode you just use both encoders to draw the wave form scratch. The left encoder moves drawing cursor up and down, the right – right. Push the right encoder to initiate drawing. The cursor will change to small cross.

You can't move the cursor left, as the wave should change over the time, and it can't go back in the past. We recommend to draw waves that start and end at horizontal axis otherwise you may hear undesired clicks.

In **LINE SKETCH** mode you can draw the wave by connecting lines between two points defined by cursor. move the cursor to desired position and push the left encoder to initiate drawing.
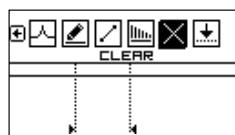
As you draw the wave, you can check the **HARMONIC CONTENT** of it, specifically, the first 32 harmonics. To do so, use the left encoder to select SPECTRAL icon in the top row.
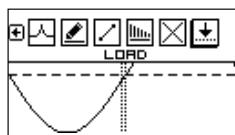
The wave with the corresponding spectrum of harmonics will appear on the screen. You also can alter the wave by adjusting harmonics. Use the left encoder to navigate thru harmonics (selected one gets bolder) and the right one to adjust amplitude of the harmonic.

You also can design the wave only by adding harmonics in various amplitudes. Just select the new wave and start with the SPECTRAL icon. Each harmonic represents a sinewave with a frequency which is multiple of the first harmonic. Use the left encoder to navigate thru harmonics (selected one gets bolder) and the right one to adjust amplitude of the harmonic.

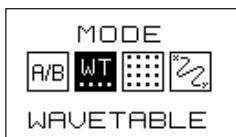If you are not happy with the wave created, just click the **X BOX** and the wave will be erased and you can start

Once you are happy with the wave, you've created, select SAVE box and save the wave. NAME menu will appear.

In the NAME menu you can name your waveform and save in user generated wavetables. Follow the pop-up screens to allocate the wave in a desired wavetable. You can change the position of the wave in the list in the MANAGE menu.
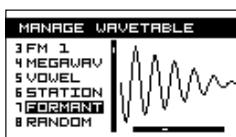
> WAVETABLE MENU <

In Waveteble menu you can select wavetables of 16 waves from the list of BANKS and play them back, while morphing thru waves using MORPH knob or Morph CV.
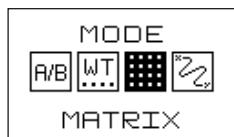

Use the left encoder to navigate thru the list of BANKS and push it to confirm selection.
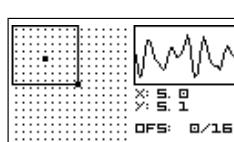

As the bank is selected, you can use MORPH knob to browse through the waves in the bank and hear, how the bank sounds.

You can design wavetables in Wave list menu or in the Graphic VCO Google App (see below). Waves added to the wavetables are automatically morphed for the best sound.
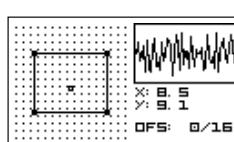
> WAVETABLE MATRIX MENU <

In Wavetable Matrix mode you have your wavetables and waves displayed as a matrix, where rows represent wavetables (wavetables appear in the order as set in MANAGE menu) and columns – individual waves. All waves are represented as dots in the matrix and active wave – one which is played back – as bolder dot.

X and Y under the oscilloscope screen represent currently selected wave position, while OFS - allows you to offset all wavetables in the screen up. For example, if you have 32 wavetables in total then OFS: 2/16 will mean that the screen indicates wavetables from 3 to 18. You can change the offset position by clicking and rotating the right encoder.

The default setting of the wavetable matrix is 8 wavetables x 8 waves. Use the left encoder to move the matrix left or right and the right encoder to move the matrix up and down.

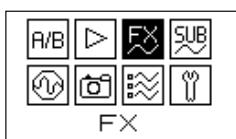Use X and Y potentiometers or relevant CV inputs (X and Y) to navigate through waves within the matrix.

You can alter the size of the matrix by clicking the left encoder. At the first click the bold dot in the top left corner will appear and you can adjust the size of the matrix by rotating left and right encoders, at the second click the bold dot will appear in the bottom right corner and you can do adjustments again. The third click will freeze the size of the matrix and you can use left and right encoders to move the matrix vertically and horizontally.

Note that CV inputs automatically adjust to the size of the matrix, meaning, CV span of -5V to +5V will play back all waves in the matrix and will not play back ones outside.
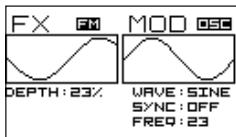
> FX MENU <

In FX menu you can apply several effects on the waves being played back. FXes are master settings and they are applied on the resulting wave before the output. FXes (except frequency modulation) ar NOT applied to the suboscillator.

Rotate the left encoder to scroll thru effects. Selected effect appears in the top left corner of the screen. Available effects (in order of appearance) are Frequency Modulation, Ringmodulator, Phase Distortion, Wavefolder, Wavewrapper, Bitchrush/Sample rate reduction and Overdrive.
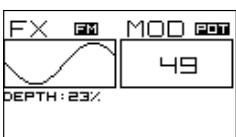
FX AMOUNT potentiometer defines the depth of the effect (for some effects – Dry/Wet); FX potentiometer sets the frequency of the internal modulation oscillator (see below). When external CVs are applied, these potentiometers become attenuators. Please note that FX AMOUNT CV input accepts positive only CVs.
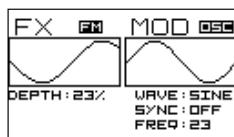

Let's explore the **FM EFFECT**! Push the left encoder to access the DEPTH setting – relative maximum value (depth) for which the frequency modulation will be performed, in other words – the depth of the frequency modulation when FX AMOUNT potentiometer is in full CW position. Available values are form 0 to 100%. Push the left encoder again to return to effect select menu.
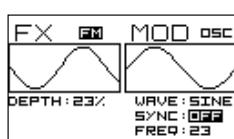
"Oscilloscopes" – the main signal an the modulator are just for visual reference – they do not perform actual measurements.
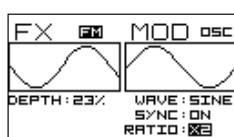

On the right side of the screen you have modulator settings. There are three options: POT (potentiometer), external modulation input (IN) and the internal modulation oscillator (OSC). Rotate the right encoder to select one of those! Push the encoder to access the next modulator setting!

Let's start with the **INTERNAL MODULATION OSCILLATOR (OSC)**. First, you have selection of the waveforms (WAVE). Rotate the right encoder to browse the waveforms. Available waveforms are: Sine, Triangle, Ramp, Sawtooth, Square, Sample&Hold. Note that not all modulation waveforms will give nice resulting sound. We recommend to begin experiments with the sinewave.

Once you have selected the waveform push the right encoder to configure synchronization of the modulation oscillator. Rotate the right encoder to select synchronization ON or OFF, meaning, if the internal oscillator runs independently or its' frequency is synchronized to the frequency of the main oscillator.

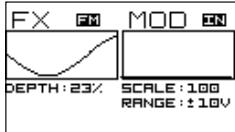With SYNC: OFF you can adjust the internal oscillator frequency. Rotate the FX potentiometer to set the frequency from 0.13Hz to 4000Hz.

With SYNC: ON you can select synchronization ratio. Rotate the FX potentiometer to desired sync ratio (the module provides both multiplied and divided frequencies). Note that module will play back the resulting wave in real time and you can hear modulation sweetspots.
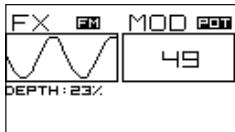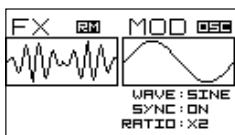
IF THE EXTERNAL MODULATOR IS SELECTED (IN), you can apply the modulation CV (LFO, envelope generator or any other modulation source) to the FX CV input, and adjust its amplitude with the FX CV potentiometer.

The small "oscilloscope" will show you the waveform of the incoming CV. Push the right encoder to access oscilloscope settings:

SCALE adjusts the timing to fit the incoming modulation wave in the oscilloscope horizontally;

GAIN – sets the gain of the FX CV input;

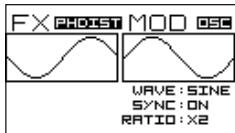BIAS – offsets the incoming CV on the FX CV input.

For some effects (specifically, phase distortion, wavefold, wave wrap, bitcrush) **MANUAL CONTROL (POT)** over the effect gives nice results. Just use the FX potentiometer to alter the waveshape.
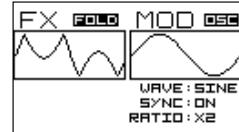
RINGMODULATOR works similar to the FM. The principal oscillator is considered a main signal, but Modulation oscillator or signal applied to the FX CV – a carrier.
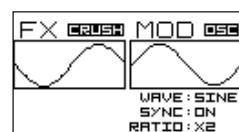
Modulation controls are basically identical.

PHASE DISTORTION has similar controls, and the setting POT turns FX potentiometer in manual phase distortion control.
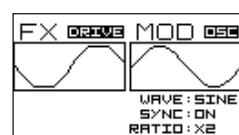
FOLD AND WRAP FX provides you distinct wavefolder or wavewrapper. Rotate the right encoder to select between wavefolder (FOLD) or wavewrapper (WRAP). Push the right encoder to access GAIN adjustment and OFFSET adjustment if you use an external modulation source.

Use modulation setting POT for manual wavefolding with the FX potentiometer.

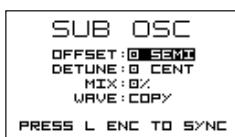**CRUSH FX** is bitcrusher. Use modulation setting POT for manual bit rate reduction with the FX potentiometer.

DRIVE FX is overdrive. Use modulation setting POT for for controlling overdrive level with the FX potentiometer.

> SUBOSCILLATOR CONFIGURATION MENU <

In Suboscillator configuration menu you can altrer suboscillator settings. The suboscillator is assigned to the OUT2. No FX (except frequency modulation) is applied on the suboscillator.

Rotate the left encoder to select settings you wish to alter and rotate the right one to alter the setting. Click the encoder to confirm.

By **OFFSET** you define the suboscillator frequency against the principal oscillator. You can offset it by semitones and maximum offset is 24 semitones (-2 octaves)

You can **DETUNE** the suboscillator by +-50 cents for analogue-like pulsating sound.

MIX% IS DRY/WET FADER for the OUT2, where 0% is copy of the signal form OUT1 and 100% is suboscillator only. All other positions give a mix of principal oscillator and suboscillator.

WAVE allows you to select, what wave is assigned to the suboscillator. Click and rotate the encoder to select the wave.

> OSCILLOSCOPE MENU <

The OSCILLOSCOPE menu is designed to monitor signal status during performance.

It shows a waveform being played back at the moment including morphing between waves and FXes applied.

It also indicates the tune of the VCO in notes and Hz, as well as time passed from the powering on the modular system. If you wish to reset the timer to keep timing of your performance, just push the right encoder and the timer will reset to 0.

Push the left encoder to access controls status menu – it shows the position of controls and inputs used for the specific snapshot. In example on the left you can see the settings of the potentiometers and CV shapes applied to CV inputs.

> SNAPSHOTS MENU <

SNAPSHOT

Once you are happy how your designed waves or wavetables with suboscillator configuration and FXes applied sound you can save a SNAPSHOT – a combination of all your settings for a specific sound, which can be instantly recalled during the performance.

To save the snapshot **PUSH AND HOLD THE BACK BUTTON FOR 2"** and the snapshot will be automatically saved.

ENTER NAME
SNAPS___
ABCDEFGHIJKLMNOP
QRSTUVWXYZ012345
6789_-   CLR OK

As the snapshot is saved, the snapshot name menu will appear.
Use the right encoder to navigate thru characters and click to confirm the selection. Click OK to confirm the name.

SNAPSHOT   ACTION
1 TEST
2 SNAPZC   RND
3 YO DUDE
4 SNAPS   CLR

To recall the snapshot, open the snapshots menu and us the left encoder to select the snapshot form the list. Click the encoder to confirm the selection.
NB! When the new snapshot is selected potentiometers (except TUNE) will start to have effect only when they are rotated to the position saved with the snapshot (see the Oscilloscope menu).

YO DUDE
RENAME
DELETE

To delete or rename the snapshot, push and hold the left encoder for 1" and delete/rename screen will appear.
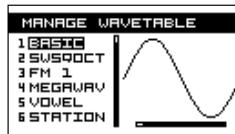

DELETE?
NO   YES

Confirm delete or rename by pushing the left encored.

> MANAGE <

MANAGE

MANAGE menu allows you to rearrange wavetables, edit them and create new ones.

MANAGE WAVETABLE
1 BASIC
2 SWSQOCT
3 FM 1
4 MEGAWAV
5 VOWEL
6 STATION

Rotate the left encoder to browse through the wavetables and rotate the right encoder to browse through the waves within the wavetable.

FM 1
EDIT
RENAME
DELETE

Pushe the left encoder for 1" to access the wavetable edit/rename/delete menu.
NB! Factory preset wavetables can not be overwritten. You can edit them, but you will need to save them under different name.

For more comfortable wavetable managing we recommend to use the dedicated Graphic VCO web interface (will be announced later).
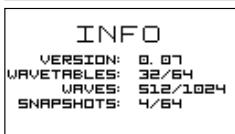
> DEVICE CONFIGURATION MENU <

CONFIG

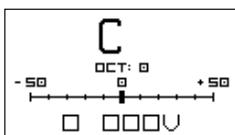In the Device configuration menu you can adjust system and hardware settings.

CONFIG
i
INFO

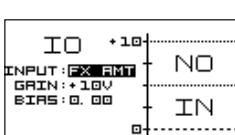Rotate the left encoder to access various configuration settings

INFO
VERSION: 0.07
WAVETABLES: 32/64
WAVES: 512/1024
SNAPSHOTS: 4/64

Info menu contains information on firmware version and memory usage

DISPLAY
BRIGHTNESS: 11
CONTRAST: 10
INVERT: OFF
SCOPE: LINE

In the display configuration menu you can adjust display brightness, contrast and invert the display appearance to the black background. Use the left encoder to browse thru menu and rotate it to adjust settings. If you wish to film a demo of the module, we recommend to set minimum brightness ;)

C
OCT: 0
-50   +50
0 000V

The osciloscope configuration menu you can use the left encoder to browse thru menu shows current tune of the VCO in semitones and cents, 1V/oct input status, and rotate it to adjust settings.

IO   +10
INPUT: FX AMT   NO
GAIN: +10V
BIAS: 0.00
IN

In the IN/OUT configuration menu you can configure CV inputs by adjusting their gain, and bias. Use the left encoder to select the input or setting and right one to adjust the amount of the setting.

> FIRMWARE UPDATE <

To have the module functionality up to date, we recommend you time by time check announcements about firmware updates for the Graphic VCO on www.ericasynths.lv or on our social media.

You can update the firmware of the module via miniUSB cable.

To do so, follow instructions below:

1) Remove the module from the rack and disconnect the PSU cable
2) Open Google Chrome and open Erica Synths Firmware Updater App.
3) Connect the module to the USB port of the PC
4) Select a Graphic VCO module form the list
5) Push and hold both encoders and connect the module to the PSU

ERICA SYNTHS
BOOTLOADER
VERSION: 0.2

6) Release the encoders and the firmware update screen – Erica Synths BOOTLOADER will appear on the module.
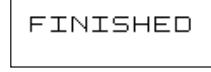

ERASING
PLEASE WAIT!

7) Hit the PROGRAMM button in the Updater App screen!

WRITING
PLEASE WAIT!

8) The module will indicate the update status and will notify when the update is completed

VERIFYING
PLEASE WAIT!

All waveforms and snapshots saved on the module will not be affected after the firmware update.

FINISHED

> SAFETY INSTRUCTIONS <

Please follow the instructions for use of the Erica Synths Graphic VCO below, 'cause only this will guarantee proper operation of the module and ensure warranty from Erica Synths.

Water is lethal for most of the electric devices, unless they are made waterproof. Erica Synths module is NOT intended for use in a humid or wet environment. No liquids or other conducting substances must get into the module. Should this happen, the module should be disconnected from mains power immediately, dried, examined and cleaned by a qualified technician.

Do not expose the module to temperatures above +50° C or below -20° C.

Transport the instrument carefully, never let it drop or fall over. Warranty does not apply to modules with visual damages.

The module has to be shipped in the original packaging only. Any module shipped to us for return, exchange and/or warranty repair has to be in its original packaging. All other deliveries will be rejected and returned to you. Make sure you keep the original packaging and technical documentation.

> DISPOSAL <

This device complies to the EU guidelines and is manufactured RoHS conforming without use of lead, mercury, cadmium and chrome. Nevertheless, this device is special waste and disposal in household waste is not recommended.

> CREDENTIALS <

You will find Erica Synths terms of warranty at **www.ericasynths.lv**.

Items for return, exchange and/or warranty repair have to be sent to:
Erica Synths, Andrejostas Str. 43, Riga, Latvia, LV-1045

User manual by Girts Ozolins@**Erica Synths**.

Design by Inese Verina-Lubina and Anna Matisone.

Copying, distribution or any commercial use in any way is prohibited and needs the written permission by **Erica Synths.**

Specifications are subject to change without notice.

In case of any questions, feel free to contact us through **www.ericasynths.lv** or via e-mail **info@ericasynths.lv**.