VCO MODE ALGORITHMS

Icon	Algorithm	Parameter
	Sine	Phase distortion
	Sqr/Pulse	PWM
	Saw/Tri	Wave shape
	Quad saw	Phase spread
	Additive even (1)	Harmonics
	Additive odd (1)	Harmonics
	Additive all (1)	Harmonics
	Unison square	Spread
	Unison saw	Spread
	Bit-crushed saw	Bit resolution
	Bit-crushed sine	Bit resolution
	Self-sync sqr	Carrier Frequency
	Self-sync pulse	Carrier Frequency
	Self-sync saw	Carrier Frequency
	Self-sync tri	Carrier Frequency
	Self-sync sine	Carrier Frequency
	Ring modulator	Carrier Frequency
	Noise + low-pass	Resonance
	Noise + bandpass	Band Width
	Noise + resonator	Filter gain

(1) Additive algorithms are only available in osc1

LFO MODE ALGORITHMS

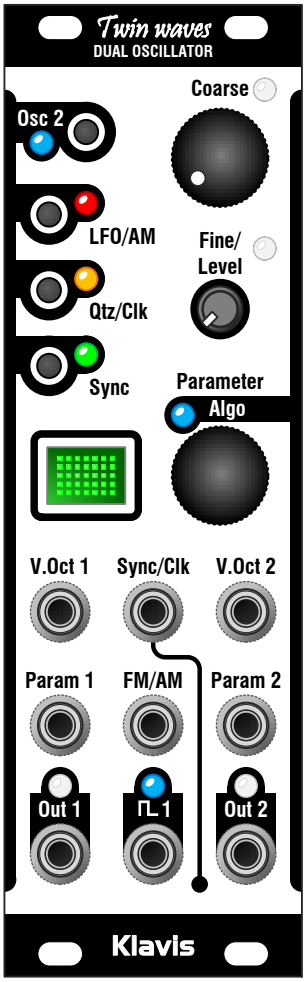
Icon	Algorithm	Parameter
	Saw/triangle	Slope
	Square/pulse	PWM
	Sine	Phase distortion
	Brownian S/H	Random level max deviation
	Randomly timed S/H	Time randomness
	Brownian vectors	Random level max deviation
	Randomly timed vectors	Time randomness

VCO QUANTIZER

Quantize name	Icon	Details
Quarter tones	¼	
Semitones	½	
Diatonic	Di	c, d, e, f, g, a, b
Major	M	c, e, g
Minor	m	c, d#, g
Natural Minor	nm	c, d, d#, f, g, g#, a#
Thirds	3”	c, e, g#
Fifths	5”	Fifth to fifth; does not repeat over octaves!
Octaves	Oc	c

LFO EXTERNAL CLOCKING

LFO mult and div ratios	
16x	/1.5
12x	/2
9x	/3
8x	/4
6x	/6
4x	/8
3x	/9
2x	/12
1.5x	/16
1x	/32
	/48
	/64



Inputs & outputs

V.Oct 1 & 2 drive the pitch in VCO mode, and rate or clk ratio in LFO mode.

Param 1 & 2 control the dynamic parameter relating to the current algorithm.

Sync/Clk can be Sync or clock input for osc 1 and/or 2. This jack is shared by both sections and enabled separately.

Out 1 & 2 are the wave outputs.

Section 1 only:

FM/AM is linear FM in VCO mode and out level control in LFO mode.

The **[square] 1** out is a sub-octave for VCO mode or trigger pulse at LFO rate.

FRONT PANEL

Controls

OSC2 Switches between Osc 1 & 2. Allocates buttons, knobs and display to the first or second oscillator. When LED is on, Osc2 is selected.

LFO/AM sets the LFO/VCO mode. When on, the current oscillator is in LFO mode and the FM jack becomes AM.

Qtz/Clk accesses the quantizer when in VCO mode or the ext clocking when in LFO mode. When LED is on, some quantize or external clocking is active.

Sync is about VCO or LFO wave sync (restart). When LED is on, some sync is enabled.

Algo when pressed, the LED flashes; if then turned, it selects one of the algorithms. When turned with LED off, it changes the **Parameter** related to the current algorithm.

Coarse sets the VCO pitch or LFO rate. With external LFO clocking active, it controls the mult/div ratio.

Fine/Level sets the tuning in VCO mode or output level in LFO mode.

USAGE

The module contains two sections/oscillators, each individually set as VCO or LFO. VCO and LFO modes have their dedicated selection of synthesis algorithms.

Each algorithm has a specific dynamic parameter that can be changed with the encoder and via CV from the Param jack.

The white LEDs next to the potentiometers tell when the knob is active and cursor shows the actual setting.

Pressing a button brings the editing, which is done with the encoder. Validation is done by pressing the encoder.

Settings are maintained and recalled after power cycle.

Sync and Clk control are exclusive, but any one of these can be simultaneously activated when sections are both LFO.
In VCO mode there is no Clock setting; instead comes a quantizer with various scales.

With both sections in VCO mode, a long press on Osc2 offers 3 uses of the V.Oct inputs:

- Separate - each input drives its own oscillator
- Added - the sum of both inputs is sent to both oscillators
- Offset - V.Oct 1 drives both oscillators;
  V.Oct 2 comes in addition on oscillator 2.

INSTALLATION

Despite using a full size Eurorack supply connector (2x8pin), the Twin waves only requires +12 and –12V supply.

Ensure that there is enough power left to supply this module.

Beware of the orientation; the stripe on the ribbon cable should match a similar stripe for the –12 (minus 12 Volts) indication on your supply board connector.

Supply rail	Current draw
+12V	46 mA
-12V	18 mA
+5V	0 mA

READ ME FIRST

SUPPORT & ADDITIONAL INFO

The complete users manual is available on:
www.klavis.com/support

Contact us: modular@klavis.com