

v0.9.0

QV-L : Quad Variable LFO

The QV-L is a 12 hp eurorack-format module with 4 digital LFOs that offer a variety of waveforms. In addition to the 4 CV outputs (range: -5 to +5V), there are 4 assignable CV inputs for modulation, and two gate inputs for Reset and Clocking.

The front panel UI comprises two OLED displays, 4 buttons and 6 high-resolution endless potentiometers. Within this manual, the pots are referred to by number: 1-3 for the left-hand side, top to bottom, and, 4-6 for the right-hand side. On each screen, you can edit up to 6 parameters, one for each knob.

The QV-L works great as a standalone CV modulation source, but you can also connect it to a Vector Sequencer for sync and MIDI. Using the included 8 pin cable, connect one end of the cable to the Backplane header on the QV-L and the other to J28 on the Vector Sequencer, red stripe up on both ends.

The QV-L requires 120mA of current on +12, 20mA on -12 and needs 35mm of mounting depth with a power cable attached. Use the included 16 pin cable to connect to your power in your eurorack case.

The Main Screen



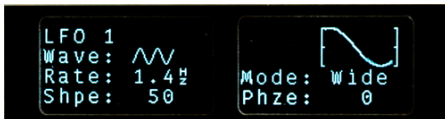
This is the primary edit page and performance interface for the QV-L. It shows waveforms for all 4 LFOs across both displays, as well as 6 parameters for quick editing. The parameters displayed here can be customized on the Custom/Clock page. LFOs 1 & 3 are displayed with solid lines, LFOs 2 & 4 with dotted ones.

Editing is organized between LFOs 1&2 on the 'A' side (left), with LFOs 3&4 on the 'B' side (right). Press EditA to move through the edit pages for Side A, EditB to move through edit pages for Side B". The two sides are fairly independent, but share presets, modulation sources and the Gate inputs.

On this page, TrigA will reset both A side LFOs, TrigB will reset both B side LFOs. However, this behavior can also be customized.

From any other page, you can back up to the previous page by pressing TrigA. You can also jump back to the Main screen by pressing and holding TrigA.

LFO Edit



Pressing EditA from the Main screen will take you to the Edit page for LFO1. Further presses will proceed to Output1, LFO2 Edit, Output2, etc. At any time, pressing EditB will switch to the B-side LFOs: 3&4.

Wave: The waveform for the LFO. See the back of this guide for a full list.

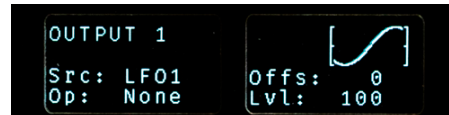
Rate: The rate of the LFO.

Shape: Most of the LFO waves offer some sort of variable shape. A value of '50' is the 'center' position.

Mode: This controls how Rate is specified. Wide and Slow offer wide ranges with a log-based taper. Hz is for cycles-per-second. There are also 3 tempo-based modes: 16th, Beat & Bar.

Phase: The starting phase of the LFO. This is important when resetting an LFO, and is a useful modulation target.

QV-L Output



Each of the 4 CV outputs on the QV-L has it's own page for selecting which LFO it will output, and for setting output-specific parameters. This allows for remarkable flexibility in setting up a patch.

Some LFO algorithms have more than one output. For example, the Lorenz wave has 3 outputs. To support such waveforms, LFOs 1 & 3 have two alternate waveforms (Y and Z) that can be routed to any output. These alternates are also available as modulation sources.

You can select an output operation: Invert, Rectify, Invert & Rectify, scale unipolar up or down, or inverted versions of those. You can also set the offset and level for the output. These settings make it easy to interface the QV-L with other modules - particularly those whose modulation inputs do not have attenuators.

Modulation



The A and B sides of the QV-L both have 4 modulation busses, two on each of two pages, for eight modulation options total.

Modulation is easy to setup: Pick a Source, a Destination and an Amount. Sources include the 4 CV inputs, all LFO outputs, and both Envelope Generators.

The top of the left OLED has two waveform displays of the LFOs for that side (LFO 1 & 2 for side A, LFO 3 & 4 for side B). These displays will show the affect of any applied modulation.

Reset / Envelope

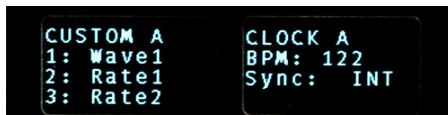


The Reset / Envelope page allows you to select what will reset the LFOs or trigger the envelope. You can choose T1 (TrigA), T2 (TrigB), G1 (Gate1) or G2 (Gate2), or one of three combinations (G1 & T1, G2 & T2, G1 & G2). Note that the Gate inputs can be used both to reset an LFO (or trigger the EG), and as a clock source (see next page).

The trigger buttons (TrigA, TrigB), can only trigger the envelopes from the Main page, on other pages TrigA is for moving backwards.

Each side of the QV-L has a simple linear envelope generator, primarily for use as a modulation source, but you can also route it directly to the outputs. You can select the EG mode (Attack/Release and Attack/Sustain/Release) as well as the attack and release rates. Always remember to select how you want to trigger the envelope. You can use a Gate input, or one of the trigger buttons (TrigA, TrigB).

Custom / Clock



On this page you can select the 3 parameters that are visible on the Main Screen. You can choose LFO Wave, Rate, Shape and Phase, Output Level and Offset, and the Amount for each of the 4 modulation busses.

For clocking, you can set the QV-L to run off an internal clock, select either of the Gate inputs to use as a 4PPQN clock source, or, if you have connected the QV-L to a Vector via the backplane connection, sync from the Vector.

When syncing to an external clock it is often useful to patch a reset signal into one of the Gate inputs and have it reset any LFOs that are set to a beat-based rate mode. Also when resetting an LFO, the Phase parameter for the LFO becomes important -- it is sets the starting position for the waveform.

Preset / Prefs



To navigate to the Presets page, press and hold EditA and EditB together. The left OLED shows which preset has been loaded, and allows you to edit its 5 character name. Use knob 2 to select which char to edit, and knob 3 to change the char. Use knob 4 to select the preset operation to perform: Save, Load, Initialize (this preset), or Reformat (all presets). For saving and loading, use knob 5 to select which preset location to save to or load from. The QV-L can store 48 presets in Flash memory. Use Trig B to execute the operation. As of firmware 0.9.0, presets are not automatically saved.

To navigate to Prefs, press EditB. Here you can set the amount of time before sleep mode is entered. Also, the current firmware version is listed on the left OLED.

Waveforms

Sine, Triangle, Saw Up, Saw Down, Shark Left, Shark Right : Each of these basic waveforms has a shape control to widen or narrow one half of the wave relative to the other. These waveforms respond very well to modulation on Level and Shape to create new waveforms. For all waveforms, Shape=50 is the base wave.

Square : Shape controls pulse width.

S&H : The Sample & Hold algorithm can sample an internal random source, any of the CV inputs, or any of the other LFOs and EGs.

Sine / Tri, Saw / Tri, Saw / Square : These are morphing waveforms. The Shape parameter smoothly morphs from one waveform to the other. The alternate (Y and Z) versions of these waves output the un-morphed versions.

Tips & Tricks

Stairstep Up / Down / Up & Down : Three stairstep variations, Shape controls the number of steps.

Sine/Saw/Square Seq & Pulse Width Seq: These are two 'Sequenced' wave variations. The Shape parameter is quantized so that the waveform output jumps from one shape to another. For Sine/Saw/Square, Shape moves between five shapes, for Pulse Width between five different PW options.

LOR: A version of the Lorenz Attractor chaotic function. This waveform has 3 outputs. You can access the 2nd and 3rd outputs by assigning output to the Y or Z versions of LFO1 & 3.

PRL: A perlin-noise style wave. In practice it acts a bit like a random walk function.

LM1: An implementation of the Logistic Map chaotic equations.

Tips & Tricks

Navigation Shortcuts:

From the Main Screen, press and hold EditA to jump to the first modulation screen. You can then press and hold TrigA to jump back to the Main Screen. If you navigate to any other screen, and then press and hold TrigA, it will remap that shortcut to the screen you were just at.

QV-L As an Audio Source:

Although the QV-L is primarily intended for below-audio-rate modulation, it can be pushed into audio rates, and can be used as an audio source for percussive sounds or noisy textures. The S&H wave, run at near-audio or audio rates is a particularly interesting noise source.

Level Modulation:

Using one LFO to modulate the level of another LFO is a surprisingly flexible way to create new waveforms.

Similarly, using an S&H wave to modulate another LFOs level or rate by a small amount is an easy way to add subtle variation to a waveform.