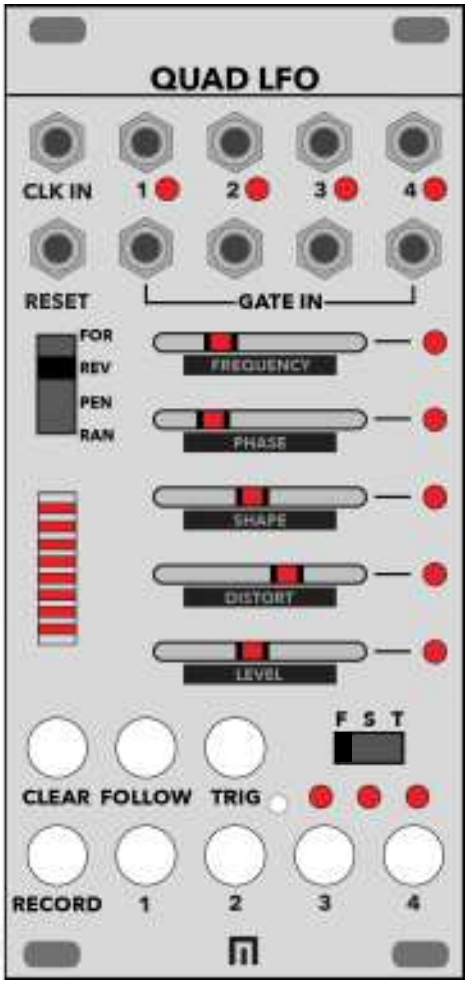
QUAD LFO MANUAL V.1



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SPECIFICATIONS

FORMAT:
EURORACK

DIMENSIONS:
12HP, 26mm deep

INTERNAL AND EXTERNAL SIGNALS (3.5mm jacks):
0-5V Logic I/O

MAX CURRENT:
-12V 17mA
+12V 85mA
+5V: n/a

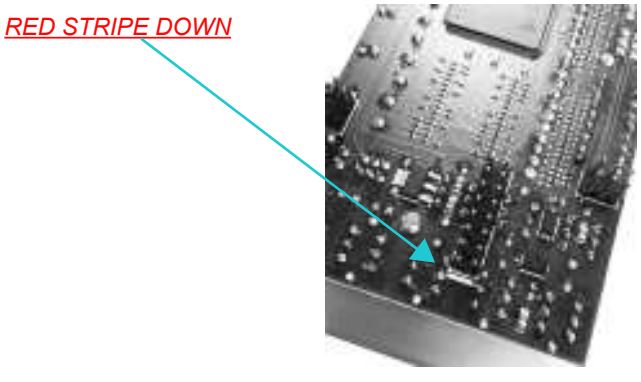
INSTALLATION

Remove module from packaging.

Power down your modular synthesizer and disconnect the power cable from the wall outlet.

Attach the included power cable to the module's power connector and connect the other end to the power distribution bus in your EuroRack synthesizer case. Position the red stripe DOWN on your Quad LFO.

Position the module on the mounting rails in your EuroRack case and screw down mounting screws. Power up! If your case does not turn on properly then you have installed the module incorrectly. Simply power down and make sure to follow the diagram when reconnecting the module.



DESCRIPTION

An LFO, or low frequency oscillator, sends control voltage out in the shape of a waveform. The Quad LFO available shapes include sine, ramp, saw and pulse and moves through these shapes using the SHAPE slider. You can send these 4 distinct LFOs directly out or to other modules for frequency modulation, VCA control, filter control, etc.

What makes this Quad LFO module different is that it also includes a 16 step automation sequencer as well as autosave or expanded preset functions when used in conjunction with Varigate 4+ and Varigate 8+.

To create a sequence of automation for an LFO, hold the RECORD button and move the sliders for Frequency, Phase, Shape, Distort and Level and those slider movements will play back automatically as the Quad LFO cycles through the sequence. This sequencing feature allows for a multitude of dynamic possibilities for live performance and recording.

Set each LFO to trigger via one of the 4 individual gate inputs, or set channels 2 through 4 to follow channel 1 for quadrature and phase modulation. Change the direction of each channel of sequenced automation to Forward, Reverse, Pendulum or Random. Switch the playback speed and style between Fast, Slow or Tempo Sync. There are also inputs for both Clock and Reset.

Features include:

- 4 LFOs, each with it's own individual output
- 16 steps of automation recording for LFO settings per channel (+ Clear Automation function)
- Fold, Bit Crush and Noise distortion
- Set each LFO to trigger via one of the 4 gate inputs
- Forward, Reverse, Pendulum and Random switch for sequenced automation direction per LFO
- Follow Mode (Quadrature)
- LFO level control
- LFO waveform control
- Frequency control
- Phase Control
- Autosave stand-alone or save up to 16 presets with Varigate 4+ and 100 with Varigate 8+ via busboard
- Switch between Fast, Slow or Tempo Sync per LFO
- Clock in
- Reset in

CONTROLS

LFO OUTPUT CHANNELS 1-4:
Connect your patch cables from these outputs to other module CV inputs to modulate them with the QUAD LFO. There are a total of 4 individual LFOs/outputs, each with an LED indicating output is active.

CLK IN:
External CLOCK INPUT. Clock input is required for the animation sequencer to run. Clock is also received from a Varigate 8+ or 4+ if connected to the same busboard. Incoming clock also controls LFO tempos set to TEMPO MODE (see pg.5).

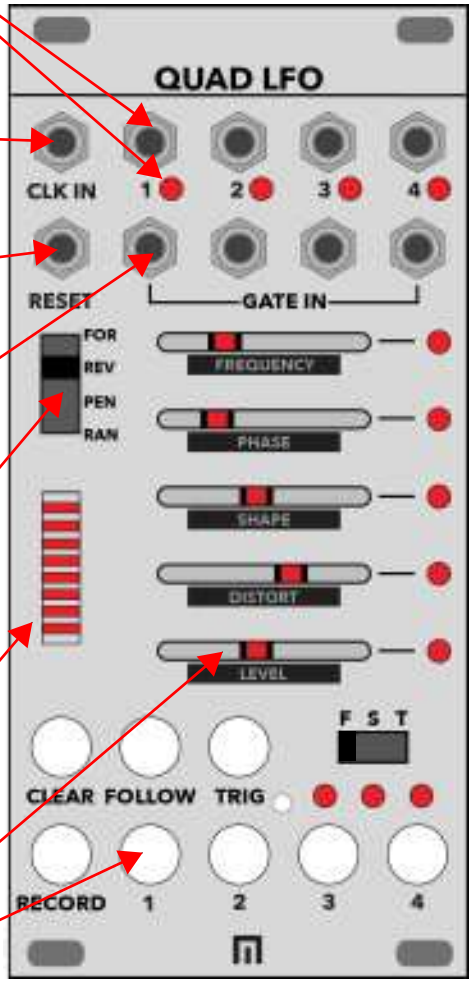
RESET:
Gate input for resetting to step 1 of the animation sequencer.
- Forward, Pendulum, Random reset to step 1.
- When in Reverse, resets to step 16.

GATE INPUTS:
Each LFO can be re-triggered/restarted with an individual gate (or cycle without a gate input).

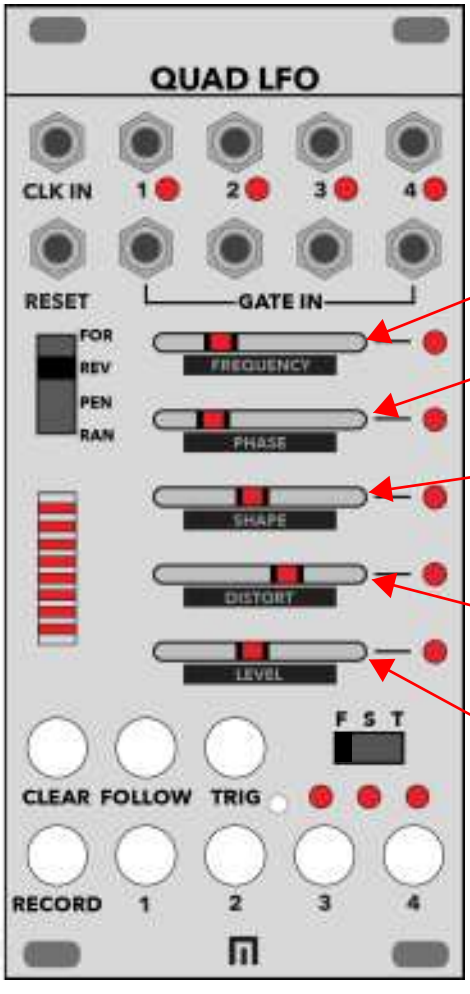
FORWARD/REVERSE/PENDULUM/ RANDOM SWITCH:
Switch to change the direction of sequenced, automated recording of an LFO. To enable a particular direction for each of the 4 LFOs, press an LFO channel select button and then move the switch.

LED BAR GRAPH:
Displays the sequence direction. Each step will pulse twice for a total of 16 steps.

LFO PARAMETER SLIDERS:
Each of the 4 LFOs include their own set of parameters that can be adjusted with the sliders. Select LFO buttons 1-4 and then move the sliders to adjust FREQUENCY, PHASE, SHAPE, DISTORT and LEVEL per LFO.



CONTROLS



FREQUENCY:
Sets the frequency of an LFO.

PHASE:
Sets the phase of an LFO.
- Start point from 0 degrees to 360 degrees

SHAPE:
Moving this slider left to right will morph the shape of the LFO from:
SINE - RAMP - TRIANGLE - SAW - PULSE
(10 to 90% pulsewidth).

DISTORT:
Moving this slider left to right will change the type of distortion applied to an LFO:
FOLD - BIT CRUSH - NOISE

LEVEL:
Adjust the level of an LFO output.

The LEDs to the right of these sliders indicate the position of the slider (brightest red for sliders set all the way to the right).

CONTROLS

LFO 1-4 CHANNEL SELECT BUTTONS:
To select an LFO for parameter editing, press one of these buttons. The active LFO LED will now be lit and you can now start dialing various settings. To switch to another LFO, push another one of the buttons and so forth.

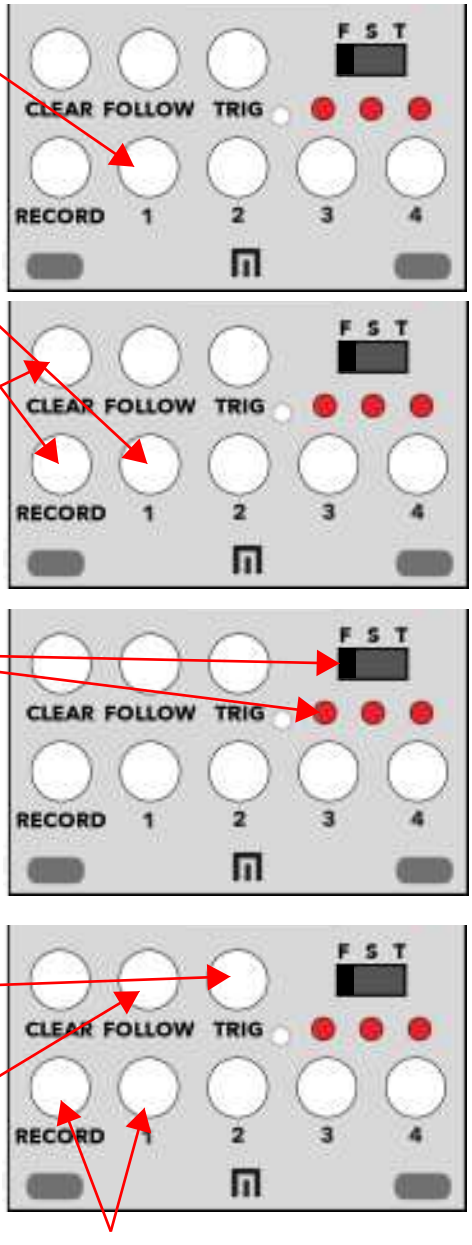
RECORD:
To record parameter automation in a sequence for an LFO, select the LFO channel button you want to record sequenced automation so that it is lit, then hold the RECORD button while you move the sliders. Make sure you are already receiving incoming clock or this feature will not work otherwise. Now you can change the direction of the sequence as well by adjusting the sequence direction switch.

CLEAR:
Holding CLEAR while moving sliders will clear existing automation recording for that specific control. Holding CLEAR while pressing a channel select button will clear all automation for that channel.

FAST/SLOW/TEMPO SPEED SWITCH:
Set each LFO to either FAST, SLOW or TEMPO (clock based) cycling. Each of the 4 LFOs can have a different speed setting via this switch. FAST and SLOW modes will ignore incoming clock. The LEDs under the switch represent position.
Frequency Ranges:
Fast Mode: 1hz to ~2khz
Slow Mode: ~3 seconds to 1hz
Tempo Sync Mode: 64 clock pulses per cycle (or 4 bars) to 1 clock pulse per cycle (1/16th notes).

TRIGGER:
To set an LFO to trigger a one-shot cycle of a waveform, first make sure you have an external trigger source connected to gate inputs 1-4, select an LFO button and then press TRIGGER.

FOLLOW:
To enter FOLLOW MODE (LFOs 2 thru 4 can follow LFO 1 and their individual phases can be adjusted to create quadrature), select LFO buttons 2-4 and then the FOLLOW button.



SMOOTH AND "STEP" FUNCTIONS:
The Quad LFO automation sequences are set to SMOOTH by default (we've added a bit of slew to these transitions so that they are seamless). However if you want the transitions to be more abrupt for a particular LFO animation sequence, hold the RECORD button while pressing one of the LFO channel select buttons. You will now see the sequence steps on LED bargraph pulse in a more step like manner.

USING THE QUAD LFO WITH THE VARIGATE 8+ OR VARIGATE 4+

LFO 1-4 CHANNEL SELECT BUTTONS:
When connected to the same power bus, the Quad LFO will receive incoming clock from the Varigate 8+ or Varigate 4+ over the bus (there is no need to connect a clock input to the front of the Quad LFO).

Using the Quad LFO in tandem with the Variage 8+ also enables you to save up to 100 Quad LFO presets. To save presets simply hold SAVE and then press one of the Gate channel select buttons on the Varigate 8+ (just as you would normally save a preset on the Varigate 8+). To recall those presets, hold RECALL then select one of the Gate/preset channels on the Varigate 8+.

Using Quad LFO in tandem with the Varigate 4+ enables up to 16 Quad LFO presets. Follow the same instructions as outlined for the Varigate 8+.

WARRANTY

This product is covered by the Malekko Heavy Industry warranty, for one year following the date of purchase. This warranty covers any defect in the manufacturing of this product. This warranty does not cover any damage or malfunction caused by incorrect use such as, but not limited to, power cables connected backwards, excessive voltage levels, or exposure to extreme temperature or moisture levels. The warranty covers replacement or repair, as decided by Malekko Heavy Industry. Please visit our website malekkoheavyindustry.com to obtain full warranty information and to register your product for coverage.