# Quick Start Guide
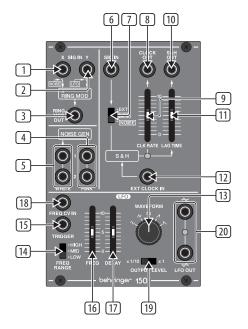
## 150 RING MOD/NOISE/S&H/LFO

Legendary Analog Ring Modulator/
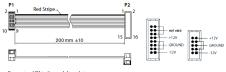Noise/S&H/LFO Module for Eurorack

## Controls



(1) **EXT SIG X/NOISE** jack routes audio signals or noise into the ring modulator. The audio signal or noise coming in through the EXT SIG X/NOISE jack is combined with and modulated by the carrier signal routed into the EXT SIG Y/LFO jack.

(2) **EXT SIG Y/LFO** jack routes the carrier signal into the ring modulator. The carrier signal can be in the audio range, such as a 500 Hz sine wave, or a signal from Low Frequency Oscillator (LFO).

(3) **R.M OUT** jack sends out the final ring modulator signal.

(4) **PINK** output jacks offer dual white pink noise outputs for use other modules.

(5) **WHITE** output jacks offer dual white noise outputs for use with other modules.

(6) **EXT SIG** input jack routes external signals into the S&H circuit for processing. Use the EXT/LFO/NOISE switch to optimize the EXT SIG input for different types of signals.

(7) **EXT/LFO/NOISE** sliding switch optimizes the EXT SIG for use with control signals (EXT), signals from a Low Frequency Oscillator (LFO) or noise signals (NOISE).

(8) **CLOCK OUT** jack sends out a clock signal generated inside the S&H circuit.

(9) **CLOCK RATE** slider controls the internal clock signal's rate before the clock signal is routed out through the CLOCK OUT jack.

(10) **S&H OUT** jack sends out the final S&H (Sample & Hold) signal over cables with 3.5 mm TS connectors.

(11) **LAG TIME** slider can be used to smooth out the changes between control voltage values as the slider is raised, similar to a portamento or glide effect on a keyboard.

(12) **EXT CLOCK IN** input jack routes an external clock signal into the S&H circuit.

(13) **WAVEFORM** knob selects between sine, triangle, square, ramp and sawtooth waveforms for the LFO.

(14) **FREQ RANGE** sliding switch selects between high (H), mid (M) and low (L) frequency ranges.

(15) **TRIGGER** jack allows a control voltage to trigger the LFO waveform by resetting the amplitude to 0. The waveform then returns to the original amplitude at a rate set by the DELAY slider.

(16) **FREQ** slider fine-adjusts the LFO frequency within the range chosen by the FREQ RANGE switch.

(17) **DELAY** slider controls the amount of time that elapses between the beginning of a new note and the LFO's amplitude peak.

(18) **FREQ CV IN** input jack allows a control voltage to control the LFO frequency in place of the FREQ slider.

(19) **OUTPUT LEVEL** sliding switch selects between a full-strength LFO output signal (x1 setting) and a 1/10th-strength signal (x 1/10 setting).

(20) **LFO OUT** output jacks offer dual LFO outputs for use with cables with 3.5 mm TS connectors.

## Power Connection



Connect end P1 to the module socket
Connect end P2 to the power supply

The 150 RING MOD/NOISE/S&H/LFO module comes with the required power cable for connecting to a standard Eurorack power supply system. Follow these steps to connect power to the module. It is easier to make these connections before the module has been mounted into a rack case.

1. Turn the power supply or rack case power off and disconnect the power cable.

2. Insert the 16-pin connector on the power cable into the socket on the power supply or rack case. The connector has a tab that will align with the gap in the socket, so it cannot be inserted incorrectly. If the power supply does not have a keyed socket, be sure to orient pin 1 (-12 V) with the red stripe on the cable.

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3. Insert the 10-pin connector into the socket on the back of the module. The connector has a tab that will align with the socket for correct orientation.

4. After both ends of the power cable have been securely attached, you may mount the module in a case and turn on the power supply.

## Installation

The necessary screws are included with the module for mounting in a Eurorack case. Connect the power cable before mounting.

Depending on the rack case, there may be a series of fixed holes spaced 2 HP apart along the length of the case, or a track that allows individual threaded plates to slide along the length of the case. The free-moving threaded plates allow precise positioning of the module, but each plate should be positioned in the approximate relation to the mounting holes in your module before attaching the screws.

Hold the module against the Eurorack rails so that each of the mounting holes are aligned with a threaded rail or threaded plate. Attach the screws part way to start, which will allow small adjustments to the positioning while you get them all aligned. After the final position has been established, tighten the screws down.

## Specifications

| Signal Connections | |
|---|---|
| **Ring modulator** | |
| Ext signal X / Y | 2 x 3.5 mm jack |
| X Impedance | 100 kΩ unbalanced |
| Y impedance | 100 kΩ unbalanced |
| Maximum level | +20 dBu |
| R.M out | 1 x 3.5 mm jack |
| Impedance | 100 Ω unbalanced |
| Maximum level | +15 dBu |
| **Noise generator** | |
| White | 2 x 3.5 mm jack |
| Impedance | 1 kΩ unbalanced |
| Output level | 0 dBu |
| Pink | 2 x 3.5 mm jack |
| Impedance | 1 kΩ unbalanced |
| Output level | 0 dBu |
| **S & H** | |
| Ext signal | 1 x 3.5 mm jack |
| Impedance | 100 kΩ unbalanced |
| Maximum level | + 17 dBu |
| Ext clock in | 1 x 3.5 mm jack |
| Impedance | 100 kΩ unbalanced |
| Threshold | > 1 V |
| Clock out | 1 x 3.5 mm jack |
| Impedance | 1 kΩ unbalanced |
| S & H out | 1 x 3.5 mm jack |
| Impedance | 1 kΩ unbalanced |

| **LFO** | |
|---|---|
| Freq CV in | 1 x 3.5 mm jack |
| Impedance | 100 kΩ unbalanced |
| CV input range | 0 V to +10 V |
| LFO out | 2 x 3.5 mm jack |
| Impedance | 1 kΩ unbalanced |
| Output level | 1 V p-p / 10 V p-p |

| Controls | |
|---|---|
| **S & H** | |
| Clock rate | 1 x slider, 2 Hz - 25 Hz |
| Lag time | 1 x slider, 0 - 8 seconds |
| Ext / LFO / noise | 3-way sliding switch |
| **LFO** | |
| Freq range | 3-way sliding switch High / mid / low, selectable |
| Frequency | 1 x slider, 0.03 Hz - 30 Hz in 3 ranges |
| Delay | 1 x slider, 4 ms to 8 seconds |
| Waveform | 5-way switch Sine / triangle / square / sawtooth /inverted sawtooth, selectable |
| Output level | 2-way sliding switch x1⁄10 / x1, selectable |

| Power | |
|---|---|
| Power supply | Eurorack |
| Current draw | 60 mA (+12 V), 50 mA (-12 V) |

| Physical | |
|---|---|
| Dimensions (H x W x D) | 44 x 81 x 129 mm (1.7 x 3.2 x 5.1") |
| Rack units | 16 HP |
| Weight | 0.16 kg (0.35 lbs) |

## LEGAL DISCLAIMER

## LIMITED WARRANTY

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