



## THE GRENDEL FORMANT FILTER

Inspired by the human voice, the Grendel Formant Filter is an effect processor that creates vocal-like vowel tones from external audio using subtractive synthesis. It contains four voltage-controlled analog bandpass filters and a low pass filter pre-set to 160 Hz. The filters are configured in parallel, all receiving the same input signal and with their outputs mixed together internally. A dedicated CV processor is included to modulate the characteristics of the BPFs in special patterns. Each BPF covers a specific range of frequencies, creating a stack of animated filters that simulate the resonance of the mouth as vowel tones are spoken.

MODE 2: 4 bandpass filters + 160 Hz low pass filter

MODE 1: 4 bandpass filters only

BYPASS: No filter effect (gain knob is active)

## CHOOSING SOURCE MATERIAL

Choosing a frequency-rich signal source such as a sawtooth waveform or pink noise will give the strongest effect. The human vocal cords produce a unique waveform (the glottal pulse) which can be approximated by an asymmetric triangle wave with its leading edge faster than the trailing edge. Using an oscillator which has variable symmetry may achieve more natural-sounding results. Note that a pure sine wave input gives weak results because it lacks overtone content which the Formant Filter needs to produce its effect. For the most vocal-like tones, your source oscillator should have a fundamental frequency in the range of 50 – 1000 Hz. Complex signals such as percussion loops, string pads, or even another vocal will be worth experimenting with as well. Pre-distorting your source audio with fuzz or overdrive can add harmonics and give a stronger effect.

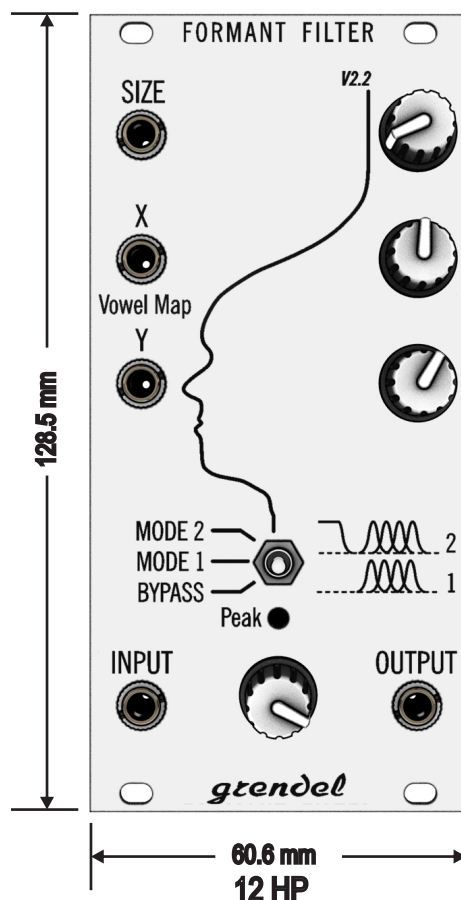
## CONNECTING AUDIO

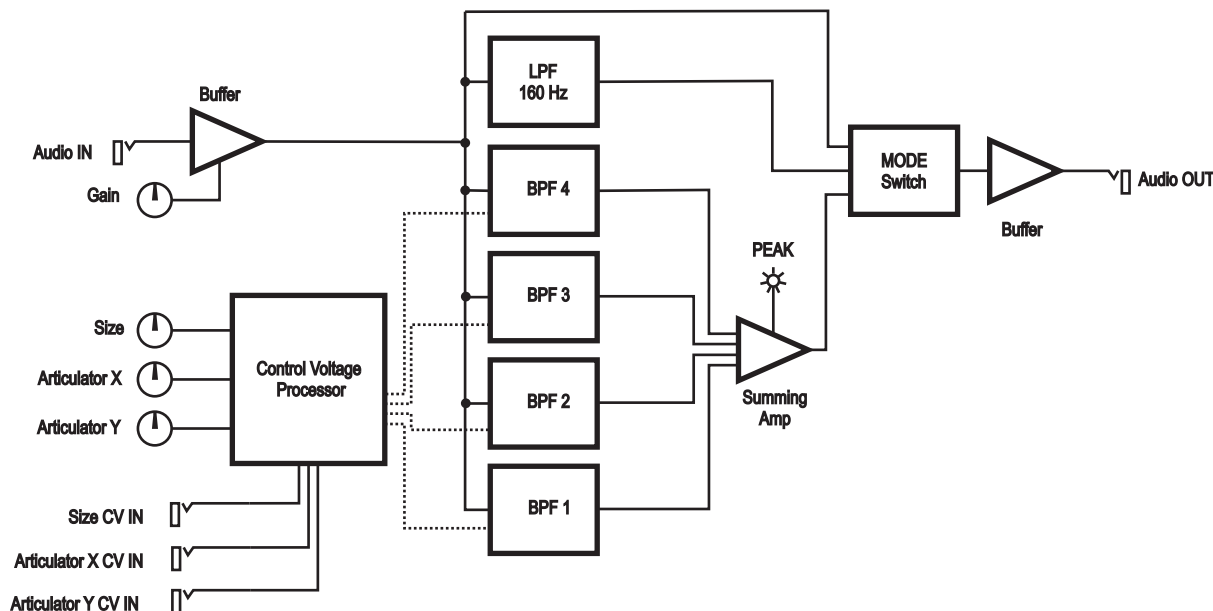
To hear the effect, patch the output of your signal source to the Formant Filter's audio input, and connect the Formant Filter's audio output to your audio monitoring chain via a mixer. Use the Gain knob (at the bottom) to adjust the input level to the filter. This patch is good for droning sounds, and also recommended when you are playing a keyboard instrument as the audio source. Or, you can patch a VCA after the filter to create the classic subtractive synthesis signal chain – VCO > VCF > VCA with CV/Gate control.

This module does not add any gain boost to the signal. To process a low level signal such as a microphone, you will have best results by connecting a preamplifier between the source and this input.

## PEAK INDICATOR

A peak indicator light is located above the Gain knob. This LED illuminates to indicate that the Formant Filter input is being overdriven. To maintain a clean sound, back the Gain knob down slightly if the peak LED lights.





## VOLTAGE CONTROL (CV INPUTS)

The Grendel Formant Filter has three control voltage (CV) inputs. They are designed to give full range of control from either a 0..5V input or -2.5 ... +2.5V input. Each CV input is summed internally with its associated bias knob, located directly to the right of the jack. When connecting a source that ranges 0..5V, turn the bias knob fully counterclockwise.

Suggested signal sources for the CV inputs are LFO, envelope generator, MIDI-CV converter, analog joystick controller, envelope follower, sequencer, random voltage generator, etc. Applying modulation of 100Hz or higher frequency may cause unexpected jumps in volume.

Even if the CV inputs are not used, you can control all of the Formant Filter parameters manually by tweaking the knobs.

## SIZE

The SIZE parameter moves all four BPFs in parallel, maintaining their relative pitch relationships. This affects the overall range of the vocal effect, from deep to high. It can also produce WAA-WOW vowel sounds if manipulated simultaneously with Articulator X and Y.

## ARTICULATOR X, Y

Experiment with each articulator alone and in combination to hear the range of vowel tones the Formant Filter is capable of.

Articulator X and Y work together to select vowel tones from a two-dimensional map. Many vowel sounds of the English language are available. For optimum control, these inputs can be connected to an analog joystick or two channels of a MIDI-CV converter. The ideal voltage range for controlling Articulator X and Y is +/- 2.5 volts, or 0..+5 volts.

## INSTALLATION AND POWER SUPPLY

The package includes 4 each of mounting screws (M3x6), and a ribbon cable to connect the module with any standard eurorack power supply.

The power connector on this module is keyed to prevent accidentally inserting the plug backwards.

This module requires +12V at 55 mA, and -12V at 55 mA. It is OK to use a +/- 15V supply.

In the unlikely event reverse polarity power is applied, the protection circuit in this module will appear as a short circuit to your power supply.

## SPECIFICATIONS

Format ..... 12 HP eurorack  
Size ..... 60.6 mm (W) x 128.5 mm (H)  
Depth required behind panel ..... 30 mm  
Power source ..... +/-12VDC or +/-15VDC  
Current consumption ..... 55mA each rail  
Reverse polarity protection ..... Yes

Audio  
Connectors ..... 3.5 mm mono (unbalanced)  
Input impedance ..... 33 k $\Omega$ , AC coupled  
Output impedance ..... 1 k $\Omega$   
Audio gain range ..... -  $\infty$  to 0 dB  
Dynamic Range ..... 80 dB

CV Inputs  
CV input range ..... +/-2.5V or 0..+5V  
Input impedance ..... 20 k $\Omega$

Mass (not incl cables) ..... 99 g (3.5 oz)  
Technology ..... analog surface mount