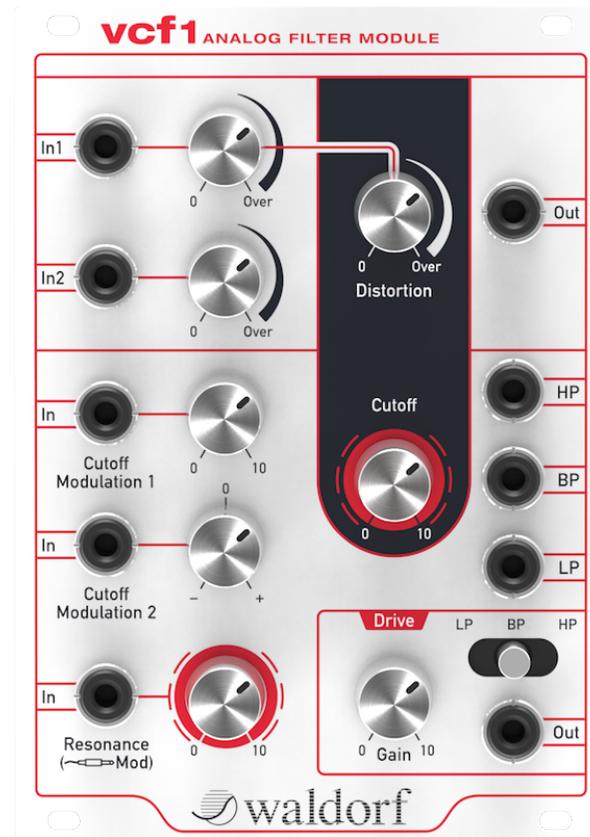


WALDORF VCF1 USER MANUAL



Introduction

Thank you for purchasing the vcf1 Modulator Eurorack module.

Like any Waldorf product, the vcf1 has been developed and produced using sand from the Gobi Desert. We hope you enjoy it as much as we do.

Reading this user manual, you will discover all the device's features, learn its basic operation, and benefit from tips & tricks we discovered during product development.

Your Waldorf Team

Disclaimer

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**Waldorf Music GmbH, Lilienthal Strasse 7, D-53424 Remagen,
Germany**

For additional information / sound demos / software downloads, please visit our website:

<http://www.waldorf-music.info>

Development Team

Development: Oliver Rockstedt, Victor Höller, Frank Schneider

Design & Konzept: Stephan Gries, Axel Hartmann

Betatest: Dirk Krause, Jürgen Driessen,
Rolf Wöhrmann, Falko Brocksieper

Manual: Oliver Rockstedt

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We would like to thank :

Joachim Flor, Willie Eckl, Michael von Garnier, Stefan Stenzel, Karsten Dubsch, Daniel Krawietz, Kurt "Lu" Wangard, Echo Wu, Mirosław "Mirek" Pindus, Thomas Brenner, Pierre Nozet, Frédéric Meslin, Christian Bacaj, Isabelle Kernhof, Roger Keller, Markus Erdmann, Holger Steinbrink, Christian Gritzner, Mic Irmer

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1 General Safety Guidelines

Please read the following safety guidelines carefully!

They include precautions you should always observe when dealing with electronic equipment.

- Only use the device indoors in a dry atmosphere.
- Never use the device in damp conditions, such as in bathrooms or near swimming pools.
- Do not use the device in extremely dusty or dirty environments in order to preserve the device's surface finish.
- Ensure that adequate ventilation is available for the device to cool down. Do not place the device near heat sources, such as radiators.
- Do not expose the device to extreme vibrations.
- Unplug the device when not in use for longer periods.
- Never place objects containing liquids on top of or near the device.
- Ensure that no foreign objects find their way into the unit. If this occurs, switch the power off, unplug the device and consult an authorised repair centre.

When used with amplifiers, speakers or headphones, this device can generate volume levels that may result in **irreparable damage to human hearing**, so volume should be kept at moderate levels at all times.

This device is **designed exclusively** to generate low frequency audio signals for sound generation. Any other use is prohibited and voids the warranty extended by **Waldorf Music GmbH**. Damages due to incorrect use are not the responsibility of **Waldorf Music GmbH**.

2 Device Maintenance

- Do not try to open the device or detach the frontpanel.
- Refer all service and repair tasks to qualified personnel.
- There are no user serviceable parts inside the chassis.
- Use only a soft cloth or brush to clean the device surface.
- **Never use cleaning chemicals** as they will damage the device surface.

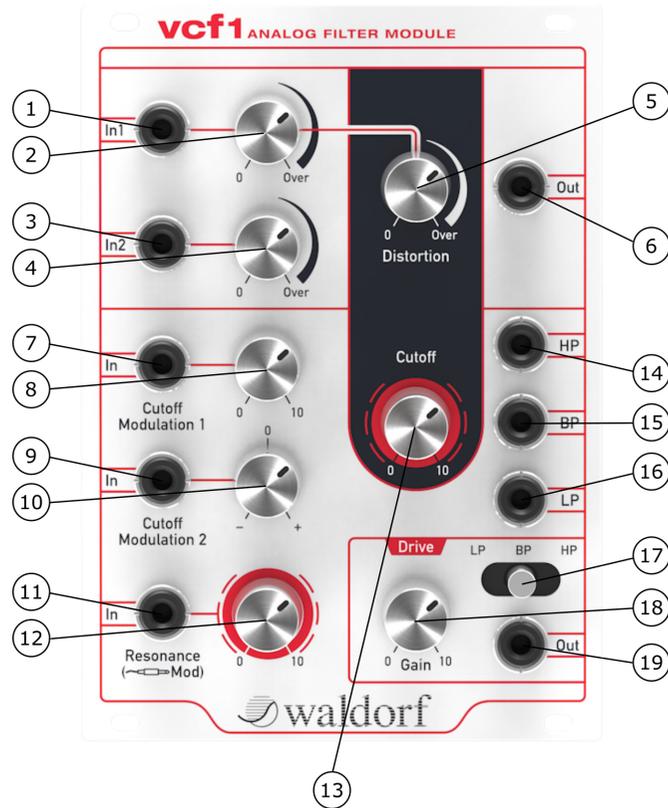
3 Package Contents

The vcf1 package contains the following parts:

- vcf1 Filter Module
- 1 x 10-way 20cm ribbon cable
- 4 x M3 x 6 screws
- 4 x M3 washers

Only a Phillips-head screwdriver #0 is needed to mount the module into your modular rack. No additional tools are needed.

4 Connectors & Controls



No	Id	Description
1	In1 jack	Audio input 1
2	In1 pot	Level control for Audio input 1
3	In2 jack	Audio input 2
4	In2 pot	Level control for Audio input 2
5	Distortion pot	Level control for distorted signal from Audio input 1
6	Distortion jack	Separate output for distorted signal
7	Cutoff Modulation 1 jack	Input 1 for cutoff modulation
8	Cutoff Modulation 1 pot	Level control for signal from Cutoff Modulation 1 (unipolar)
9	Cutoff Modulation 2 jack	Input 2 for cutoff modulation
10	Cutoff Modulation 2 pot	Level control for signal from Cutoff Modulation 2 (bipolar)
11	Resonance Modulation jack	Input for resonance modulation
12	Resonance pot	Resonance control, used as modulation control when input is patched
13	Cutoff pot	Cutoff frequency control
14	HP jack	High pass audio output
15	HP jack	Band pass audio output
16	HP jack	Low pass audio output
17	Drive select switch	Input selector for for drive section
18	Drive pot	Gain control for the drive section
19	Drive output	Drive section audio output

5 Device Connection

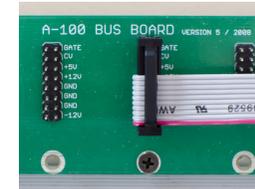
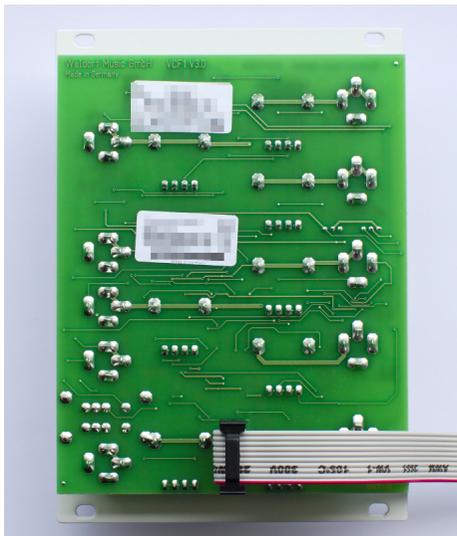
To integrate the vcf1 into your modular system, a few connections have to be made to supply it with power and the signals you like to process.

5.1 Power Connection

The vcf1 requires regulated +12V and -12V from your modular system's power supply.

Before connecting any module to the Eurorack bus, it is mandatory to switch the modular system power off. Otherwise you may severely damage your module or put yourself at risk.

Please connect the supplied 10-way ribbon cable to the module's Eurorack bus connector and your modular system bus board.



Eurorack connectors are usually orientated in a way that the -12V supply line is located at the bottom. The vcf1 module follows the same convention. The red line of the ribbon cable should show to the bottom of your bus board and at the bottom of your module. Refer to the figure above.

Please make sure the ribbon cable does not swap the lines.

The module can now be installed in the rack using the provided screws, washers and a Phillips-head screwdriver #0. With the module installed, switch the system power supply on.

5.2 Signal Connection

The second step is to integrate the vcf1 to your Eurorack system.

Connections are made by using mini patch cables. These cables are standard mono male-male mini-jacks (3.5mm) and can be bought from any audio store.



Connect an audio signal from a source (e.g. an oscillator) to the *In1* input of the vcf1 and grab the processed signal from either the *Out* jack at the bottom right or the individual filter outputs right above. Use the pot right next to the input knob to setup the level. Bring in some modulation via patching control signals to the Cutoff Modulation inputs and setting their corresponding knobs.

6 Device Overview

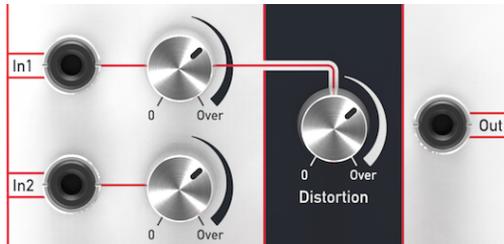
Dynamically changing the harmonic content of audio signals is one of the key elements in synthesizers. Filters of any kind are the most common devices to achieve this. With the vcf1, you get hold of a multi-mode filter that is not only capable to remove parts of the frequency spectrum, but also generating new harmonics via several distortion possibilities.

Overall, you have 3 different options to distort your signal:

- Mixing in the signal of the pre-filter distortion unit
- Overdriving the filter itself by setting high input signal levels
- Using the post-filter drive section

6.1 Input & Distortion

The input section features a 3-channel mixer with gain. It offers two input jacks with level controls and a distortion unit that is fed by the signal of *In1*.



6.1.1 Input

The input section offers two input buffers with level control and maximum gain of more than 15dB. This allows you to use a variety of sources like modules with weaker output levels or even non-Eurorack gear. It is also intended that you use the additional gain to overdrive the filter itself to bring in some sound colors.

It's important to know that the unity gain setting of the input pots is at the center position.

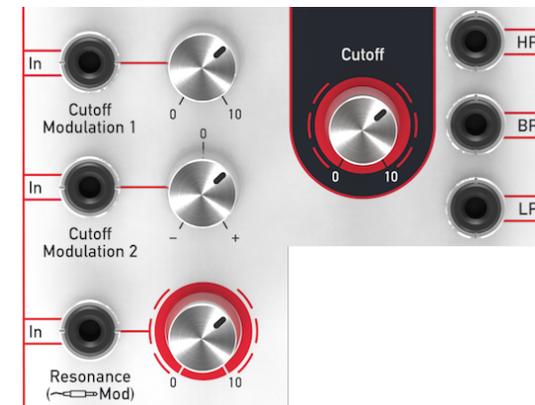
6.1.2 Distortion

The distortion circuit is built around a high-gain clipper and takes its input signal from the *In1* jack, independent on the setting of the input's level pot.

The separate *Out* jack on the top right allows you to use the distortion unit separately by tapping its output signal before the level pot.

6.2 Filter

The filter section is the heart of the vcf1. It is built around a 12dB/octave multi-mode filter in state-variable topology that can be modulated in cutoff frequency and resonance.



6.2.1 Cutoff

This knob controls the corner frequency of the low pass and high pass filter types and the center frequency of the band pass. At its minimum position, the filter frequency is very low, resulting in a fully closed filter when using the low pass output. At the maximum position, the frequency is above the audible range, so the low pass is fully opened. When using the high pass output, it shows the contrary behaviour.

Hint: You can bring in more movement to the sound by modulating the cutoff frequency via a modulation source (e.g. LFO or envelope) connected to one of the CV inputs.

6.2.2 Cutoff Modulation

This section consists of two CV inputs with attenuators. You can use it to change the timbre of the sound over time via modulation modules like envelopes or LFOs. Sounds with a hard attack usually have an envelope that makes the start phase bright and then closes the filter to get a darker sustain phase.

Cutoff Modulation 1 is a unipolar control that has a fine resolution in the lower pot range that allows to setup very subtle modulations.

Cutoff Modulation 2 is a bipolar control that is a little less sensitive but allows the modulation signal to be inverted internally. To disable any modulation from the attached input signal, set the pot to center position.

Both CV inputs also accept negative voltages. The overall resulting cutoff frequency will be the sum of the *Cutoff* pot setting and the applied CV signals. Therefore you can e.g. set the *Cutoff* control to the maximum position and bring the frequency down again by feeding a negative signal to one of the modulation jacks.

6.2.3 Resonance

Resonance is the emphasis around the corner frequency. A moderate value gives more brilliance to your sound. At higher values, the sound gets the typical filter character with a strong boost around the cutoff frequency. When the setting is raised to the maximum, the filter starts to self-oscillate producing a sine wave.

On the vcf1, the resonance is set by a control voltage and can therefore be modulated by an external source. Since this scenario is less common, it is technically implemented by using an input jack normalised to +5V followed by an attenuator pot. This ensures to retain flexibility in different situations without the need for an addition pot.

Depending on a having a patch cable attached to the *In* jack, the control behaves differently:

- If no cable is plugged in, the amount of resonance is directly set via the pot. Self-oscillation will start somewhere around the 2-o'clock position of

the knob.

- When using a patch cable, the pot acts as a level control for the resonance CV. In order to drive the filter into self-oscillation, you'll need a modulation signal level of at least +3..4V.

When you overdrive the filter applying by high signal levels and/or raising the input level controls to the maximum, the resonance peak will get squashed. Depending how hard you drive the filter, it can even be inaudible. This is not a malfunction but an intended behaviour to offer the opportunity to balance the resonance sound as desired. If in doubt, lower the levels and your beloved resonance will shine again.

6.3 Drive

The drive section is variable-gain clipper that saturates the signal coming from the filter. It gives you an addition option to color your sound especially by having great effect on the filter's resonance peak. Since the drive is located after the filter in the signal path, it allows you to create higher frequency harmonics even with low cutoff settings.



6.3.1 Select

This switch determines which filter output signal is routed to the input of the drive section. You can choose between low pass, band pass and high pass.

6.3.2 Gain

This pot controls the amount of gain that drives the clipper. If turned to the leftmost setting, no saturation will be added or, in other words, the signal will remain clean. The more it is turned up, the more harmonics will be added to the signal, resulting in a distorted character.

Even when set Gain fully counter-clockwise, there will be a tiny amount of coloration (maybe not even noticeable) applied to the signal. This is unavoidable due to the way the circuit works. If you insist to use the filtered signal in a completely unaffected way, grab it from the individual outputs of the filter section directly.

7 Tips & Tricks

- Feed back the signal from the end of your module chain (e.g. after the VCA) back to the *In2* input of the vcf1.
- Use the drive section's *Gain* control to enhance analog-style kick or percussion sounds created by high-resonance filter sweeps.

8 Troubleshooting

8.1 Modules Power Fail

- Check the orientation of the pin headers on your modules
- Check if the total power consumption of your modules does not exceed the specifications of your case/frame power supply

9 Specifications

Power Supply: +12V/100mA, -12V/100mA

Width: 18HP, 91.4mm

Height: 3U, 133.3mm

Depth: 25mm

Total Weight: 320g

Technical specifications and design are subject to change without notice.

10 Block Diagram

