

General

The KRAFTZWERG module is the Euro-rack compatible version of our semi-modular analogue synthesizer of the same name. It fits into any standard Eurorack frame with 3 rack units in height and can be used as part of a modular synthesis-system. The module works as a complete monophonic synthesizer with powerful options that can be expanded and controlled through CV-inputs of other signal sources and modulators like analogue sequencers. On the other hand, it is also possible to use the module's different sections independently in combination with other modules.

The KRAFTZWERG module can be used alone, even without the need to use any patch cords. The classic routing VCO-VCF-VCA as well as most popular modulations is internally prewired. Small labeling below the input jacks will indicate any existing prewiring with its destination.

Set-up and connections

The KRAFTZWERG module is fully compatible to Doepfer's A-100 modular system - in size, bus-power and CV/Gate voltage. Connect the 16-pin cable to a corresponded 16-pin jack on the Doepfer mainframe bus or the (MFB)-MIDI/CV circuit board. Supply voltage needs to be +/- 12 volts, 5-volt connections are not required. The wattage is +/- 250/100 mA, the module size 60 TE (Teileinheiten) = 300 mm.

ATTENTION: Please, check for correct polarity! The colored side of the connector-cable needs to point downwards, so that the cable is not twisted.

DUAL LFO

To the left, you will find two LFOs. These low frequency oscillators are mainly used for sound modulations, like e.g. pitch, filter or pulse width. The two sections are independent and offer three waveforms each and a CV-input with attenuator. The frequency ranges from approximately 100 Hz to 10 s and can be significantly expanded with a matching control-voltage. Positive or negative voltage can increase the maximum value (or decrease the minimum value) by a factor of 30.

Each LFO has its own reset-input (negative slope) to reset the waveform start. By adjusting the speed and using a separate reset-signal to this jack, a LFO can be synchronized to a sequencer.

LFO 1 (above) offers three waveform shapes: descending saw tooth, triangle and square.

LFO 2 (below) offers: ascending saw tooth, triangle and Sample & Hold. The maximum output voltage is \pm five volts.

The CV-inputs of both LFOs are internally connected. With unpatched inputs, **LFO1** controls the speed of **LFO2** and vice versa, the attenuation controls set the intensity/depth for the modulation by the other LFO.

TRIPLE VCO

Three voltage-controlled oscillators are next. These are controlled by a common Key-CV-signal from the A-100 system bus to **CV1**. This CV-signal conforms to the one volt/octave standard and is meant to be used for typical overall pitch-control by a keyboard or sequencer. At **CV1**, all three oscillators receive the same CV-voltage, meaning the same pitch. For individual oscillator-pitch-control, it is necessary to use the front CV inputs 1-3. This will decouple the other oscillators from **CV1**.

CV-inputs 1-3 and audio-outputs 1-3 are each interconnected. This means that a CV-signal applied to **CV1** will also control **OSC2** and **OSC3** as long as these are not individually patched. If, for example, input **CV3** is patched, **OSC3** is decoupled from the voltage applied to **CV1**, while **OSC2** is still under combined control with **OSC1**.

The output-logic is comparable: **Out3** carries all three oscillators' signals. With **Out1** or **Out2** patched, these signals are subtracted from **Out3**. To avoid internal clipping, the summing signal is slightly reduced in level compared to the individual output of **OSC3** at **Out3**.

All oscillators are globally tuned by the **Tune** control. Detuning of around +/- one octave (in reference to **OSC1**) is available for **OSC2** and **OSC3** via **Interval2** and **Interval3**. Each oscillator offers three waveforms, selectable by **Wave1...3** switches. The choices are triangle, square and saw tooth. The square symmetry (pulse width) of **OSC1** and **OSC2** is adjustable via **CV4** and **CV5** inputs. Each oscillator's register is set with the **Octave1...3** switches. Additional CV-inputs, e.g. for vibrato or creation of a pitch-envelope, are available through **CV4...6**. Depending on the setting of the corresponding switches, pitch (**OSC1...3**) or pulse-width (**PW1+2**) or all three oscillators are modulated. These inputs accept control voltage up to +/- five volts.

This section also includes digital ring-modulation of **OSC1** and **OSC2**. It is available on the separate output **RingOut**. The ring modulation sound is dependent on the selected waveforms and the pitch-difference between the oscillators.

The oscillators can also be synchronized internally or externally. With internal sync, **OSC3** acts as master. Depending on the position of the **Sync** switch, either **OSC1** or both, **OSC1** and **OSC2**, act as slaves. Inputs **CV4** and **CV5** allow the synchronized oscillators to be modulated by envelope signals. Any external signal at the **Sync In** input will replace **OSC3** as sync-master. It is usually necessary to apply a square signal here. Other waveforms will not deliver a sufficient master-signal in most cases.

The oscillators' outputs (not the RM-output) are routed into the following mixer that offers four controls: **Level1...3** (for **OSC1...3**) and **Noise** for the internal noise generator. The summed signal is internally routed to the VCF and available at **Out**.

24 dB VCF

The mixer output is internally routed into **In2** of the voltage-controlled low pass-filter with 24 dB/octave slope. **In1** allows adding another signal. The filter's frequency is set by the **Cutoff** control. **CV CUT** controls the amount of influence **ADSR1** takes on the cutoff-frequency. With an external signal connected to **CV Cut**, this control acts as an attenuator. **CV2/Key** selects whether the cutoff-frequency follows the pitch of the system-bus (key-tracking). **CV2** input can also be used to control **Cutoff**, depending on the setting of the **CV2/Key** control that acts as attenuator.

Emphasis (resonance) controls the filter's bandwidth to pronounce the cutoff-frequency. At high values, the filter starts to self-oscillate and generates a sinus-like signal without any oscillator input. The pitch of this sound is defined by the cutoff-frequency and can be controlled by the inputs as described above. Voltage control for Emphasis is also available via **CV EMP** with attenuation control. The filter-output is routed back to the input **In1**. The resulting feedback is controlled by **In1**. The feedback will also affect emphasis. Connect a cable into **In1** to disconnect the feedback path.

VCA

The final signal-processing-stage is the voltage-controlled amplifier (VCA). **Gain** allows adjusting the amount of amplification and therefore the volume of the sound – but only in combination with a control voltage, like **ADSR2** (internally connected). With settings above five, the input signal will reach the output even with no control voltage being present. This allows prelistening to sounds without keyboard control. Using this function, the KRAFTZWERG module can also be used as a filter-box without the need of being under sequencer control. A specialty: **CV2** offers an additional attenuation control for amplification gain. This jack is only active if a control voltage is present at **CV1**. A practical use is creating a tremolo effect that is only active if a sound is played.

DUAL ADSR

There are two envelope generators available. **ADSR1** and **ADSR2** offer controls for **Attack**, **Hold**, **Decay** and **Sustain**-level. When the key is released or the gate-signal is stopped, **Release** sets the time for fade out. ADSR 1/2 are both triggered by **Gate1** input. **ADSR2** can be separately triggered by **Gate2**. The default envelope shape character is exponential for both envelopes. The **1 ° 2** switch allows setting either ADSR1 and/or ADSR2 for a linear character.

Multiples

The KRAFTZWERG module offers two separate Multiples, one offering three, the other offering four jacks. Use these Multiples to distribute audio-, CV- or gate-signals to more than a single destination.



Owner's manual KRAFTZWERG Module