Owner's manual

MFB-MICROZWERG

General

MICROZWERG is a small monophonic, analogue synthesizer that can be controlled by MIDI as well as analogue CV- and Gate voltages. It offers various in- and outputs to modify the pre-wired internal signal routing using patch chords. Of course, integration to external analogue components is possible through patch chords, too. MICROZWERG contains all typical elements of subtractive synthesis and is suited for classic bass- and lead-sounds as well as various effect-sounds. In addition, MICROZWERG can be used a filter box for external line-level-audio-sources.

Set-up and Connections

Connect the external power-supply to the **Power** jack. Use **AudioOut** to connect MICROZWERG to a mixing desk, an audio-interface or an amplifier. Inputs **VCF In 1** and **2** allow feeding external audio-signals into the unit's signal path at line level to be used as a filter box. MICROZWERG is controlled by MIDI or CV/Gate inputs, located at the unit's rear panel. Use a MIDI-cable to connect **MIDI In** with the MIDI-output of a keyboard or MIDI-interface. Alternatively, the inputs **CV In** and **Gate In** can be used to connect an analogue sequencer or a CV/Gate-keyboard. Press **On/Off** to switch MICROZWERG on and off.
Attention: MICROZWERG comes with a dedicated power supply. Do use this power supply!
Attention: MICROZWERG uses analogue components. To ensure stable tuning, make sure the unit is switched on for 5-10 minutes before your performance.

Shift-Functions

MICROZWERG offers two VCO, VCF and LFO sections. However, the control panels do only exist once. The **Shift** button toggles between these sections. With the Shift-LED unlit, the control elements address **Octave** and **Wave** of VCO1, (filtermode)-**Select** for VCF1 and **Wave** for LFO1. With the Shift-LED lit, the controls are routed to VCO2, VCF2 and LFO2.

In addition, **Shift** is used to specify different system settings. Press and hold **Shift** to see these settings displayed by the LEDs.

Shift/Wave (VCO): This will set the mode of operation for the glide function. The left LED (**^**) indicates, that the glide effect is active only while playing legato. With the right LED lit, (**RM**/**Noise**), Glide is active permanently. Use the **Wave** button to toggle between both modes.

Shift/Octave: This button selects either note velocity or the modulation wheel as a control source. The left LED (**32'**) indicates velocity as control source, which will also enable the accent-function. The right LED (**4'**) determines the modulation wheel as control source (as well as MIDI-controller #1). Both functions may be assigned to different or the same modulation targets. The **Octave** button is used to select between both modes. The assignment of the modulation targets follows this selection:

Shift/Select (VCF): Activates cutoff control for the filter. With the right LED lit (**HP**), the modulation is active, with the left LED lit (**LP**), the function is deactivated.

Shift/OneShot (LFO): Activates control for the output (VCA). With the LED lit, the modulation routing to the VCA is active, with the LED unlit, the modulation is inactive. Use **OneShot** to toggle between the two states.

Shift/Wave (LFO): Activates modulation control for the LFOs speed (Rate). With the right LED lit (**S/H**), the modulation routing is active. With the left LED lit (**^**), the modulation is inactive. Use **Wave** to toggle between the two states. The assignment is done separately for both LFOs. Before assign the modulation routing, select LFO1 or LFO2 using **Shift**. Subsequently, hold **Shift** to assign the modulation as described.

Legato/Normal-Mode: Holding the **Shift** button while switching MICROZWERG on, will switch between legato- and normal-modes for the envelope. In legato-mode, a new note won't trigger the envelope if another note is still held. On the contrary, in normal-mode, every new note will trigger the envelope. When holding a note in this mode, other played notes will retrigger the envelope at their start and end.

In the following, we'll be describing the MICROZWERG's signal path as it is internally pre-wired. Possible options to break up the signal path and to modify the structure using patch chords are discussed afterwards.

Oscillator Section (VCO 1 & 2)

MICROZWERG features two analogue oscillators (VCO) with three waveform shapes each: triangle, saw tooth and square. In addition, VCO 1 allows activating a ring modulation while VCO 2 can enable a noise generator. Waveform selection is done by pressing **Wave**. Press Shift to select VCO 2. At its fifth position (no LED), VCO2 can be disabled.

Octave sets the base octave to 16', 8', 4' or 2'. **Tune** controls the tuning within a continuous range of +/- six semitones. **Interval** detunes VCO2 in relation to VCO1. The range is approx. one octave. Finally, **Mixer** adjusts the balance between VCO1 and VCO2.
The VCOs can be modulated by LFO2. By turning **Mod2** left from center, the pitches of both VCOs are modulated. Turning right from center will address the symmetry (pulse width) of the square-waveform if selected. The center position will deactivate modulation.

Glide

The **Glide** trim pot adjusts the travel speed of the portamento effect. Here, notes played one after another will glide from the first pitch state to the next at the defined speed.

Filter Section (VCF 1 & 2)

Both multimode filters work with a slope of 12 db/oct. They are wired in series and offer four alternative operation modes each: low pass (**LP**), band pass (**BP**), band reject (**Notch**) and high pass (**HP**). Step through these modes, by pressing the **Select** button multiple times. Press **Shift** to select VCF2.

The filters' cutoff frequency is determined by the **Cutoff** knob. This control commonly adjusts filter 1 and filter 2. **Space** will spread both cutoff frequencies symmetrically (offset). Turning this control counterclockwise will lower filter 1's cutoff frequency compared to filter 2. Turning it clockwise will set filter 1's cutoff frequency higher than filter 2. At center position, both cutoff frequencies are identical.

The **Resonance** control manually sets the bandwidth of both filters. At its maximum, the filters will reach self oscillation.

Attention: With resonance set to high values, the filter might be overdriven, especially when in high pass mode. This is caused by the summed output of both resonance peaks. Use **Space** to attenuate this effect, if necessary.

Direct Filter Modulation

The trim pot **KeyFollow** allows setting the filter opening in dependency to incoming pitch via MIDI or Keys-CV-inputs.
Contour determines the influence of the ADSR-envelope towards the filter frequency. Turning this knob clockwise from the center will introduce a positive modulation. Turning counter-clockwise from center will introduce an inverted modulation. At center position, no modulation will take place.
Mod1 sets a cutoff-modulation by LFO 1. Turning the knob counter-clockwise from the center will introduce modulation of VCF1. Turning it clockwise from center will introduce modulation of both filters. At center position, no modulation will take place.

Envelope (ADSR)

The envelope generator offers control for **Attack**-time, **Decay**-time, **Sustain**-level and **Release**-time. The first three phases work, while a note at the MIDI- or Gate-input is active. The release-time sets in after a note/gate-signal has stopped. The envelope is pre-wired to control both filter frequencies with an amount set by **Contour**.

Voltage Controlled Amplifier (VCA)

The final element in the signal path is the voltage-controlled amplifier. This VCA is opened by each note at MIDI- or gate-input. When used in the pre-wired configuration, the opening is carried out gate-like with minimal release to avoid unwanted clicking. Dynamic control of the VCA can take place using MICROZWERG's patch connections (see below).

Modulation Oscillators (LFO 1 & 2)

Both LFOs offers triangle, saw tooth and square waveform shapes. In addition, **LFO1** offers a ramp wave, while **LFO2** offers Sample & Hold. The waveforms are selected by consecutive pressing of the **Wave** button. Press **Shift** to select LFO2.
The frequencies are determined individually using **Rate1** and **Rate2** controls, ranging from approx. ten seconds to 100 Hz. Since both LFOs offer individual rate controls, the **Shift** button is not needed to adjust this parameter.
The **OneShot** button activates a mode, where the selected waveform is played only once after an input trigger. Press **Shift** if you want to select LFO2. Here, the LFOs acts accordingly to the selected waveform like a simple envelope.

Patch Connections

The described signal path of MICROZWERG can be modified using its 18 patch in- and outputs. These allow modifying the internal routings as well as possible integration of external modular components such as step-sequencers, CV-controllers and additional envelopes or LFOs.

LFO1 / **LFO2 Out**: These outputs carry the outputs of the LFOs to be patched to other destinations. The internal wiring to Mod1 (Filter) and Mod2 (Oscillator) will stay intact.

Mod1 / **Mod2 In**: These inputs allow feeding external modulators into both modulation sections. With these inputs patched, the internal pre-wiring of the LFOs to the modulation paths is disabled.

VCO2 CV In: This modulation input allows controlling the pitch of VCO2 individually. This is essential for oscillator-synchronization where envelope-modulation of the slaved-oscillator VCO2 is needed.

VCO2 Sync In: This input allows synchronization of VCO2 to VCO1. Patch this input to VCO1's output with VCO1 set to square waveform. Alternatively, the use of an external analogue oscillator is possible.

VCO1 Out: This output carries the signal of VCO1 to be patched to other destinations.

Mixer Out: This output carries the mixed signals of VCO1 and VCO2 in pre-filter position to be patched to other destinations.

VCF1 In / **VCF1 Out**: At input **VCF1 In**, an external signal can be fed into filter 1. **VCF1 Out** carries the signal processed only by filter 1 to be patched to other destinations.

VCF2 In / **VCF2 Out**: At input **VCF2 In,** an external signal can be fed into filter 2. The signal path is split between the filters. Filter 1 will no longer be fed into filter 2. To be able to still use filter 1's output, it is necessary to patch output **VCF1 Out** to input **VCA Add**.
Output **VCF2 Out** carries the processed signal of filter 2, just before the VCA to be patched to other destinations.

Note: Both filters work in series, one after another. In case, just a single filter is needed, patch the oscillators' output **Mixer Out** to input **VCF2 In**. For a parallel routing expand this routing by patching output **VCF1 Out** into **VCA Add**.

VCF2 CV In: This modulation input will control VCF2's cutoff frequency individually.

Contour In: Use this input to replace the internally connected ADSR envelope with an external modulator that will address both filter cutoff frequencies simultaneously. In this case, the **Contour** control is used to attenuate the CV-signal.

ADSR In: This trigger input allows triggering the internal envelope with an external gate signal. With this input patched, the internal pre-wiring to the gate signal on the unit's rear panel is disconnected. However, a MIDI-gate will still be received.

ADSR Out: This output carries the signal of the ADSR-envelope to be patched to other destinations such as the input **VCA CV In** to control the output volume (VCA).

VCA CV In: This modulation input addresses the VCA. Patching this input will disconnect the pre-wired gate routing.

VCA Add: This input allows feeding external audio signals into the VCA. It will be merged with filter2's output.

Rear panel connections
The unit's rear panel offers three additional control inputs:

CV In / **Gate In**: These two inputs allow MICROZWERG to be controlled by analogue step-sequencers or keyboards with corresponding interfacing. The CV-input follows the common 1 volt per octave standard, which is supported by most step-sequencers, analogue keyboards and MIDI/CV interfaces. The gate-input reacts to signals between 5 to 10 volts with positive polarity. Both inputs work in parallel to the MIDI-input.

LFO2 CV In: Input **LFO2 In** allows modulating the speed of LFO2. In addition to that, it will also vastly increase the LFO's modulation range. With CV-voltages up to 10 volts, its frequency will reach far into the audible spectrum (approx. 3 kHz). If controlled by an analogue keyboard or a step-sequencer, LFO2 may be used as second oscillator. Its output is available at **LFO2 Out** and can be fed back into the audio circuit at input **VCF2 In** or **VCA Add**.

In addition, the rear panel contains the **Power** input for the included external 9-volts power supply, the **On/Off switch**, the MIDI-input and the **Audio-Out** jack.

MIDI
MICROZWERG receives MIDI-notes over a range of five octaves (C1-C6). Additionally, the unit processes note velocity as well as pitch-wheel-data of ± two semitones. The modulation wheel (MIDI-controller #1) allows addressing the cutoff-frequency of the filters, the VCA and the frequency of the LFO. Modulation applies individually or combined as set by the Shift-function.

Setting the MIDI-channel
To set the MIDI-channel, press and hold **Wave** (LFO) for approx. one second. Keep holding and use the **Rate2** control to set the MIDI-channel. The value is displayed using the LEDs of the LFO-waveform. Add up the numbers next to the LEDs to set the channel. For example: 1+4 equals channel 5, 1+2+8 equals channel 11). With no LED lit, MICROZWERG is set to MIDI-channel 16.