

Instructions for use of the Manger[®] Sound Transducer (MSW)

- **MSW Cabinet Volume**

For one MSW, the volume should not be less than 8 litres as the volume of air otherwise affects the movement of the MSW diaphragm and the built-in resonance frequency rises continuously. A net volume of between 14 and 20 litres is adequate when using three MSWs.

- **MSW Cross-Over Frequency**

We recommend a cross-over frequency of between 150 and 170 Hz.

- **MSW Thiele-Small Parameters**

The Thiele-Small parameters (TSP) can be found on another sheet. Their range of application is, however, extremely limited due to the TSP cone specification. Above 150 Hz, the MSW is a bending wave radiator, below its response is similar to that of mass and spring systems ($f_s = 75$ Hz). We suggest don't using the TSP for calculations.

- **MSW Resonance Equalisation and Damping**

Electrical resonance equalisation is advantageous to the MSW. With the high pass as voltage divider, this electrical damping takes effect direct at the drive. Damping via the mechanical and pneumatic parameters of the diaphragm, i.e. damping is unwanted. This renders negative changes in the lower mid-range inevitable. The rear air passages of the front mounted MSW must not be damped by a high flow resistance in the distance range of around 6 cm. (see Zerobox suggestion)

- **MSW Filter**

A 6dB high pass filter is most suitable for the MSW. The electrical limit frequency for the high pass is approximately 350 Hz. Due to its construction principle, the MSW tends to rise to lower frequencies in the sound pressure level, so that linearisation is initially effected with the 6 dB high pass filter. The actual cross-over to the woofer therefore takes place at around 140 - 170 Hz.

- **Woofer**

Woofers should have an upper cut-off frequency of around 800 Hz; the ideal case is when no partial oscillations occur above that frequency. The low pass ought to have a slope of 18 dB and be connected in reverse. This should always be checked during assembly with a battery.

- **MSW Amplifier**

In theory, a 10-fold rise time in the amplifier is necessary in order to achieve undistorted signal transmission. For the MSW with a rise time of 13 μ s, the amplifier should have a rise time of 1.3 μ s or less. "Fast" amplifiers, e.g. MOSFET, with a cut-off frequency of $f_g > 150$ kHz meet this requirement. If necessary, the radio frequency filter (RF-filter) at the amplifier input should be modified. Musical dynamics, can be enjoyed to full advantage via the MSW with high amplifier voltage peaks. A ratio between continuous tone output and peak voltage output (< 1ms) of 1:6 has proved its worth. The amplifier should be capable of converting such a ratio at the required volume. The 8 Ohm MSW can process a short-term peak voltage of 40 V_s, the 4 Ohm version a voltage of 28 V_s (< 1ms).

We would be happy to answer any other specific queries you may have.