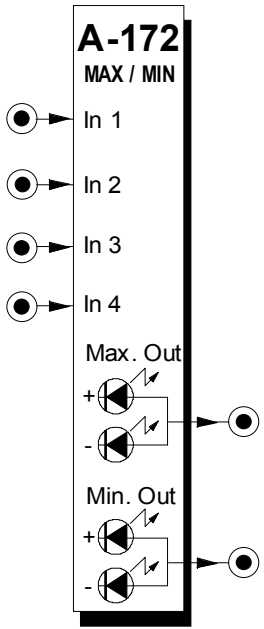


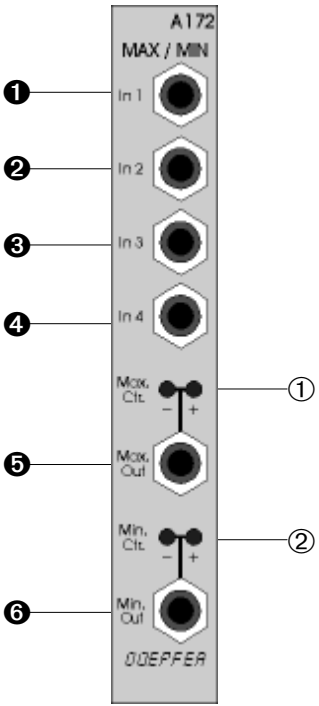
1. Introduction

Module A-172 is a **Minimum/Maximum selector**. It has available **four analog inputs** and **two analog outputs (Minimum** and **Maximum)**.

The module **permanently picks** the **maximum resp. minimum voltage** out of the four input signals and outputs these voltages to the maximum resp. minimum jack socket.

Two **LEDs** for each output help you keep track of the output signals. One LED displays positive, the second LED negative output voltages.

2. Overview



Controls and indicators:

① **Max, Ctr.** : monitoring LEDs for Maximum output

② **Min. Ctr.** : monitoring LEDs for Minimum output

In- / Outputs:

❶ **In 1** ... ❹ **In 4** : Signal inputs

❺ **Max. Out** : Maximum output

❻ **Min. Out** : Minimum output

3. Basic principles

The module permanently picks the maximum resp. minimum voltage out of the four analog input signals and outputs these voltages to the maximum resp. minimum jack socket. Fig. 1 shows the working principle by means of three sine waves with different frequencies and levels. The upper section shows three input signals , the lower section shows the corresponding outputs.

4. Controls

① Max. Ctr. • ② Min. Ctr.

These LEDs display the positive resp. negative part of the output signals at the Maximum ❺ resp. Minimum output ❻.

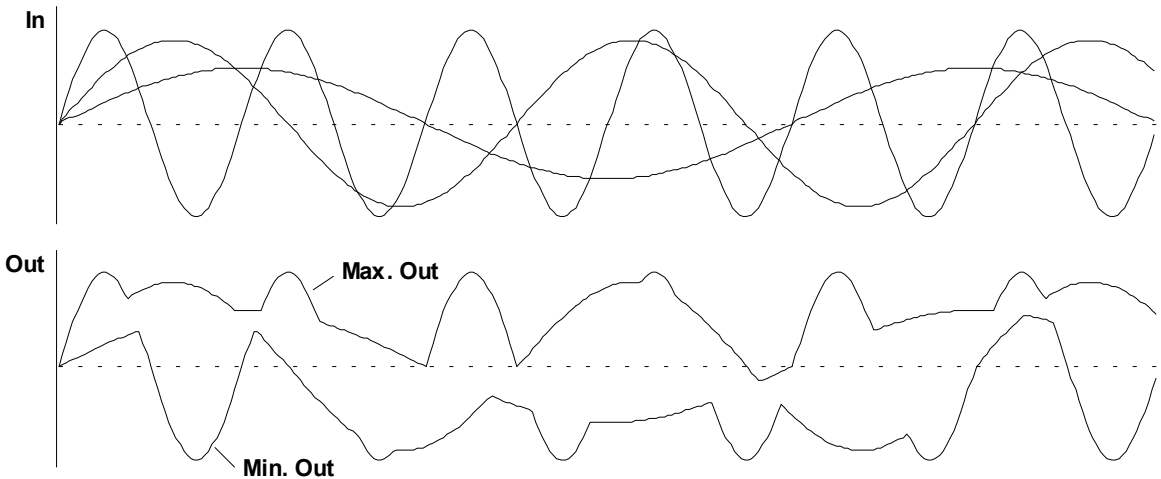


Fig. 1: Maximum/Minimum module - how it works

5. In- / Outputs

❶ In 1 ... ❹ In 4

The **input signals** are connected to these sockets. At least 2 signals are necessary to obtain the maximum resp. minimum function. Unused inputs have to be left open. Do not connect unused inputs to GND as this is equal to 0V and different from an open socket !

❺ Max. Out

This is the **Maximum output** of the module.

❻ Min. Out

This is the **Minumum output** of the module.

6. User Examples

The main application of the module is the **processing of control voltages**, e.g. random voltages, ADSR, LFO, S&H, ribbon CV, Theremin CV and similar.

To **adjust offset** and **amplitude** for each input independently (i.e. to bring the signal into the right "position" with the desired level) we recommend to combine the module with the A-129-3 Slew Limiter/ Attenuator/Offset Generator (see fig. 2).

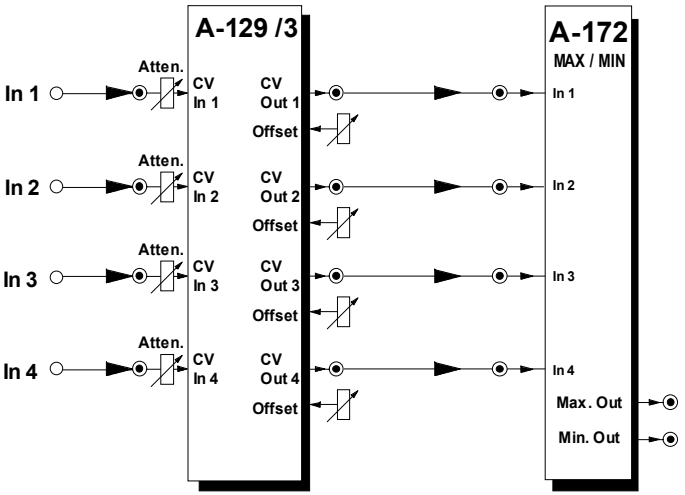


Fig. 2: Max/Min detector with individually adjustable attenuation and offset for each input signal

The module is useful for **audio processing** too. Using the outputs of a VCO as inputs creates new waveforms. Using the outputs of two or more VCOs leads to new interference sounds that are different from VCO mixing, ring modulation or hard/soft sync.
Even the **combination of control and audio signals** as inputs makes sense and causes a kind of pulse-width modulation even for saw, triangle or sine by **clipping** the upper/lower parts of the waveform.